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DETROIT RICH

EDITORIAL

On these pages the editor offers his opinions, unshackled by advertising patrons and unrestrained by anything save a sense of the decent and the truthful – the editor, alone, is responsible for their type, their tone and their tenor.

"EVER SINCE THE QUIET QUAKER DAYS OF EIGHTEEN TWENTY-ONE"

AS A broad, teaching institution, the Philadelphia College of Pharmacy and Science has continuously served the nation ever since the quiet Quaker days of 1821. Since that beginning day it has kept steady pace with the best in pharmaceutical progress, making continuous changes in its plans and practices, so that in all that time it has never lost its prestige as leader in its distinct and special field of education. A few years ago, at the inception of its second century of service, its friends, with one accord, responded to its call for more commodious teaching quarters, and with such results that its physical equipment today places it well in the lead of institutions teaching the sciences that minister to public health.

And that is precisely the unique service which this institution offers, a service which by training, experience and traditions, is peculiarly its province and privilege.

No institution in the world has a better right to be proud of its fitness to teach those diversified phases of science that support the profession of medicine in the alleviation of human suffering.

There are many institutions, hereabout, whose work is equally unique in other fields of science—in industrial chemistry, in metallurgy, in the textile arts and sciences, and in the varied aspects of chemistry.

But this institution, and this institution alone, can, by virtue of its unique background and broad present organization, claim leadership as a unit, dedicated wholly to the training of young people in those special health sciences, pharmacy, food and drug chemistry, biological engineering and public health bacteriology. Such is its present program and performance, and such are its plans for a still larger future.

Its College of Pharmacy, the oldest in this country, is a recognized professional school, and its faculty, now as throughout the

history of the College, comprises men pre-eminent in their special fields. Graduates in this course, a four-year course leading to the degree of B. Sc. in pharmacy, are the only graduates of the institution, privileged to practice pharmacy, although with further training they may and do enter upon many other scientific pursuits such as dentistry, chemistry, etc.

By virtue, however, of its being a professional school, its graduates may not, at present, have their course evaluated as affording pre-professional credits, even though they seem best fitted of all people to continue their training into the larger field of medicine.

The departments of chemistry, biology and bacteriology, however, being highly specialized departments, and fully meeting the requirements of the Pennsylvania and other boards of pre-professional education *are* recognized as pre-professional courses, although the graduates of these departments may not practice pharmacy.

However, despite these difficult and paradoxical circumstances, the teaching of these four departments is done in such a way as to have as many joint classes as possible, thus preserving a homogeneity and an *esprit de corps* in the whole student body. Only subjects, peculiar to the department, are taught exclusively to registrants in that department.

The one idea and ideal of the institution remains today as ever, the thorough and up-to-date training of its students in those special sciences whose major ministry directly or indirectly, is to preserve the health of the people.

To that end the College, through its honorable career, has always dedicated itself, and now, on the eve of seeking an adequate endowment wherewith to insure its proper place in the forward march of professional pharmacy, it reiterates its position and policy, a definition of its service:

"The Philadelphia College of Pharmacy and Science is a teaching, thinking Institution dedicated to the serious proposition of training young men and young women in those special sciences, Pharmacy, Food and Drug Chemistry, Biological Engineering and Bacteriology, sciences that serve in the preservation of the health of the people and in the amelioration of their physical ills."

IVOR GRIFFITH.

POPULAR SCIENCE

BENJAMIN FRANKLIN, it is, who stands as the first outstanding American exponent of popular science. He did it, not as so many people believe, by "flying a kite"—but by his deliberate cultivation of public interest in the cause of science, and he used as his medium of speech an intelligent, intelligible, everyday language.

Yet even today we find a breed of so-called scientists who fail to see else than crass attempts at vulgar show in all endeavors to bring the thoughts of "pure science" into a phraseology that "fitteth all understanding."

They do not realize that it is better that the secret press of science yield its story to the public mind, that scientists shall no longer write only for scientists in a language which, so far as the average person is concerned might just as well be Scandihoovian.

Recognizing that education in the varied fields of science lessens the chance of the quack and the crook, many scientific institutions have laid aside the highbrow high hat and are now on speaking terms with the laity.

One of the pioneers in this field is the Philadelphia College of Pharmacy and Science, whose delivered and printed popular science talks are now in their seventeenth season. Thousands upon thousands have attended these lectures or have read them when they have appeared in annual volumes and they have come to be something of an institution within an institution.

For the 1937 season the College announces the following program, which clearly suggests the diversity of topics and the interest which must enfold itself in their interpretation:

Wednesday evenings at the College: January 20, "Out on the Sea in Ships," George Rosengarten, Ph. D. January 27, "Bossy," the "Contented"—Versatile Servant, Freeman P. Stroup, Ph. M. February 3, "The Blood Picture in Anemia," Louis Gershenfeld, P. D., B. Sc., Ph. M. February 10, "Tobacco Tales—Retold," Ivor Griffith, Ph. M., Sc. D. February 17, "Gels and Jellies," Linwood F. Tice, M. Sc. February 24, "The Orange and Its Kin," Joseph

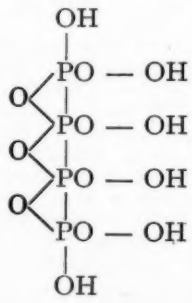
W. E. Harrisson, Ph. M. March 3, "The Ups and Downs of Mercury"—The Story of the Thermometer, John E. Kramer, B. Sc. March 10, "Flavor of Foods, Cooked and Uncooked," Charles H. LaWall, Sc. D., Ph. M. March 17, "Sleep and Sleeplessness," Horatio C. Wood, Jr., M. D. March 24, "Digestion—in Health and Disease," Arno Viehoever, Ph. D., Ph. C., F. C.

IVOR GRIFFITH.

Tetraphosphoric Acid

A high strength phosphoric acid is now made available in the form of tetraphosphoric acid ($H_6P_4O_{13}$) with the following structural formula and constants.

Sp. gr. at 20° C.	2.060
Viscosity at 85° C.	2000 sec.
P_2O_5	82 to 84%



Tetraphosphoric acid is practically a water white, viscous liquid which neither crystallizes at a temperature as low as—50° C. nor reverts when stored at room temperature for several months or when heated at 100° C. If diluted with water, however, tetraphosphoric acid will revert slowly to orthophosphoric acid. This reversion is accelerated by heating.

Tetraphosphoric acid makes available a material of high P_2O_5 content with no water present except that of chemical combination. It should open up new uses for P_2O_5 and permit development of processes now retarded for lack of an acid of this concentration.

IN 1936

TIME MARCHES ON!"—and so does progress in the sciences. Here is a brief summary of the new developments in the field of medical sciences during 1936, as compiled by *Science Service*.

Protamine insulinate, called the "most valuable discovery in the treatment of diabetes since the original discovery of insulin," was developed, for use together with ordinary insulin in treating severe diabetes, by Dr. H. C. Hagedorn and associates at Steno Memorial Hospital, Copenhagen.

Apparently one disease was transformed into another when Dr. George Packer Berry, University of Rochester School of Medicine, produced in rabbits fatal cases of the tumor disease, myxoma, by injections of killed and harmless myxoma virus mixed with the virus of non-fatal rabbit fibroma.

First synthesis of theelin, one of the female sex hormones, was reported by Prof. Russell E. Marker and Thomas S. Oakwood, Pennsylvania State College.

Apparently successful use of a preparation, known as Prontosil, in the treatment of beta hemolytic streptococcus infections including scarlet fever, puerperal fever and erysipelas, was reported by Drs. Perrin H. Long and Eleanor A. Bliss, Johns Hopkins Medical School, and in England by Dr. Leonard Colebrook, Medical Research Council, and Dr. Méave Kenny and associates, Queen Charlotte's Hospital, London. The chemical was first prepared and used in Germany four years ago.

Continuous use of the stomach tube to reduce internal pressure in the distended abdomen in cases of acute intestinal obstruction and other severe abdominal conditions was devised and its successful use reported by Dr. Owen H. Wangensteen of Minneapolis, Minn.

Long-sought cause of mussel poisoning, which has resulted in death following the eating of California rock mussels at certain seasons, was traced by scientists at the Hooper Foundation of the University of California to poisonous phosphorescent microorganisms of the sea, *Gonyaulax catenella*, eaten by the mussels.

Detection of radium poisoning became more accurate through the application of a new type of screen-cathode quantum counter developed by Dr. Robley D. Evans, Massachusetts Institute of Technology, and said to be 10 to 100 times more sensitive than older methods of detecting radium in the body.

Neutron rays are more effective than X-rays in killing tumors in animals and may prove more potent in destruction of cancers in humans, Dr. John H. Lawrence of Yale University and his brother, Prof. Ernest O. Lawrence of the University of California, reported, on the basis of studies with the atom-smashing cyclotron invented by Prof. Ernest O. Lawrence.

Growth of mouse cancers was checked with hemorrhage and destruction of the tumors following treatment with colon bacilli, meningococci and other microorganisms, Dr. H. B. Andervont, U. S. Public Health Service, reported.

Mice with spontaneous tumors lived longer and tumor growth was checked following injections of cystine disulfoxide, Dr. Frederick S. Hammett, Lankenau Hospital, Philadelphia, reported.

A new strain of yellow fever virus was isolated by scientists of the International Health Division, Rockefeller Foundation, promising more effective vaccination against yellow fever.

A new hazard from yellow fever was discovered when scientists of the Rockefeller Foundation's International Health Division found that Brazilian jungle fever is yellow fever and that other mosquitoes besides *Aedes aegypti* can carry the disease.

A chemical explanation of heart failure as a disturbance in the breaking down and rebuilding by individual heart muscle cells of phosphocreatine was

worked out by Drs. George Herrmann and George Decherd, University of Texas School of Medicine.

Visual purple, chemical compound in the eye necessary for seeing, was regenerated in a test tube for the first time under controlled conditions which make possible repetition of the feat and consequent important investigations of vision, by Drs. Selig Hecht, Aurin M. Chase, Simon Shlaer and Charles Haig at Columbia University.

A test for sense of smell and for fatigue of this sense, which may be useful in locating brain tumors, was developed by Drs. Charles A. Elsberg, Irwin Levy and Earl D. Brewer at the Neurological Institute, Columbia University.

Important function of the cortex of the adrenal glands is to regulate the amount of potassium in the blood and thus keep the body from poisoning itself, Drs. Raymund L. Zwemer and Richard Truszkowski, Columbia University College of Physicians and Surgeons, reported.

Once-fatal Addison's disease, due to injury or disease of the adrenal glands, may be successfully treated without the use of cortical hormone by giving a diet low in potassium and containing proper amounts of salt and sodium citrate, members of the staff of the Mayo Clinic found.

Successful transplantation of adrenal gland tissue from a woman suffering from virilism to a man suffering with Addison's disease restored the man's health and prolonged his life, Dr. Max A. Goldzieher, New York City, and associates reported.

First operation on the pituitary gland to refeminize a "bearded lady," with successful results lasting one year, was reported by Dr. H. Lisser, University of California Medical School.

Apparent cure by X-ray treatment of two cases of the rare disease, pituitary basophilism, caused by tumor of the pituitary gland, with restoration of the patients' health and transformation of their personalities, was reported by Dr. Merrill C. Sosman, Peter Bent Brigham Hospital, Boston.

Lipocaic, new hormone from the pancreas which controls fat metabolism in the liver as insulin controls carbohydrate metabolism and may greatly improve treatment of diabetes, was obtained by Drs. Lester R. Dragstedt, John van Prohaska and Herman P. Harms, University of Chicago.

Vaccination against ivy poison by subcutaneous injections of the irritant from poison ivy plants was accomplished in a group of CCC men by Lieutenant-Colonel J. M. Blank, U. S. Medical Reserve Corps, and Dr. Arthur F. Coca, Pearl River, N. Y.

Influenza can be more widely spread through the air than previously supposed, but ultraviolet light kills the influenza virus suspended in droplets in the air, studies by Drs. W. F. Wells and H. W. Brown, Harvard School of Public Health, indicated.

Ultraviolet light sterilization of the air in operating rooms was introduced as a means of successfully reducing infections of surgical wounds by Dr. Deryl Hart, surgeon-in-chief at Duke Hospital, Durham, N. C.

An alum-picric acid nasal spray, developed by Dr. Charles Armstrong, U. S. National Institute of Health, was widely used as a preventive of infantile paralysis in southern states. This method was 95 per cent. effective in monkeys but the method of its employment in the southern states was such as to leave its value to humans undetermined.

Successful use of placental extract in the treatment of hemophilia was reported by Drs. R. Canon Eley and Charles F. McKhann of Boston.

Surgical operations were performed on hemophiliacs without post-operative hemorrhage by means of high frequency electroscalpel and coagulation unit, Drs. Warfield M. Firor and Barnes Woodhall, Johns Hopkins Hospital, reported.

Incubation of egg white mixed with potassium bromide provides a remedy that markedly reduces the blood clotting time in hemophiliacs and continued use of the remedy may enable them to lead normal lives without danger of hemor-

rhage from slight injury or exertion, Drs. W. A. Timperley, A. E. Naish and G. A. Clark, University of Sheffield, England, reported.

Picrotoxin is an antidote for overdoses of luminal and other barbiturates, Drs. T. Koppanyi, J. M. Dille and C. R. Linegar, Georgetown University Medical School, reported.

Antidote for cyanide poisoning is injection of a mixture of amyl nitrite, sodium nitrite and sodium thiosulphate, Dr. K. K. Chen of Indianapolis, reported.

The immediate cause of certain headaches was claimed by Dr. Temple Fay, Temple University, Philadelphia, to be the amount of fluid in the brain.

Human bone marrow was grown in glass laboratory apparatus for the first time in sufficient quantities for study of blood and metabolism by a method devised by Dr. Edwin E. Osgood and Alfred N. Muscovitz, University of Oregon Medical School.

Injecting meningococcus antitoxin into the veins instead of the spinal cavity is a more effective method of treating epidemic meningitis and reduces the number of deaths from the disease, Dr. Archibald L. Hoyne of Chicago found.

Allergy or sensitiveness to certain foods can be detected by a blood test, since the number of white blood cells decreases after the offending food is eaten, Dr. Warren T. Vaughan, Richmond, Virginia, reported.

Further proof that food poisoning is due to *Staphylococcus aureus,* common microorganism that also causes boils, and that cream puffs and eclairs, foods most commonly concerned, can be made safe by reheating to 156 degrees Fahrenheit, was furnished by researches of Dr. G. M. Dack of the University of Chicago and Dr. George A. Denison of Jefferson Co., Ala., Board of Health.

Sinus infections can reach the lungs via lymphatic glands of neck and chest, Drs. Ralph A. Fenton and Olaf Larsell, University of Oregon Medical School, demonstrated.

Use of blood from the newly dead for transfusion to living persons was undertaken at the Central Emergency Hospital, Moscow, and results in nearly 1,000 cases were reported by Dr. S. S. Yudin, surgeon-in-chief.

Derivatives of morphine that are safer and more powerful than ordinary morphine were prepared by Dr. Lyndon F. Small, University of Virginia, in research directed toward development of non-habit-forming morphine. Addiction property of the new morphines has not yet been determined.

A method of preventing tooth decay by using silver nitrate to detect faults in enamel formation where decay may start was reported by Dr. E. P. Brady, Washington University Dental School.

A new alcohol, phthiocerol, isolated from the wax of the human tubercle bacillus, was reported by Prof. R. J. Anderson and S. H. Stodola, Yale University, in addition to two other new alcohols, entirely different in composition from phthiocerol, isolated one each from the timothy bacillus and the leprosy bacillus.

Medical use of vitamin B_2 may be safer as a result of studies of flavin compounds related to the vitamin which showed a chemical method of reducing the toxicity of the vitamin tremendously in the animals tested; the studies were made by Drs. Richard Kuhn and Paul Boulanger, Kaiser Wilhelm Institute.

Five wavelengths comprise the portion of ultraviolet light curative of experimental rickets by irradiation, and of these the one which is most effective rarely reaches the earth in sunshine, Prof. John W. M. Bunker and Dr. Robert S. Harris, Massachusetts Institute of Technology, reported.

IVOR GRIFFITH.

ORIGINAL ARTICLES

NOTES ON THE EFFECTS OF CERTAIN GLANDULAR PRODUCTS UPON PLANT GROWTH*

By Marin S. Dunn, Ph. D.

Professor of Biology, at the College

It is not surprising to learn that certain glandular products act upon plant tissues much as they act upon animal tissues, when we recall the similarities that exist between man, the time binder, animal, the space binder, and plant, the energy binder. See also Review, Plant Hormones, by Dr. Arno Viehoever (p. 52).

THE subject of the effect of animal hormones upon plants has been receiving increasing attention. In its ramifications are innumerable fascinating problems touching upon the properties of living matter, dealing among other things with the fundamental similarities and differences of plant and animal protoplasm, the universalities of stimulation and response, dormancy, growth and differentiation, retardation and acceleration of the life cycle, increased or decreased productivity and the like. In this paper there is no attempt made to review the literature, and the following citations have been given merely to show the nature of some of the recent findings.

Agostini (1) using standard endocrine extracts (suprarenal cortex, suprarenal medulla, ovary, corpus luteum, testicle and thyroid) on Azolla caroliniana W. and Marsilia quadrifolia L. found some to stimulate growth and others to retard it. Carbonaro, G. e D. Cavaliere (2), experimenting with Freesia refracta plants and suprarenal cortex extract and suprarenal medulla found inhibition of dimensional growth of leaves and roots but stimulation of leaf differentiation. Di Pascal (3) ascertained that alkaline extract of anterior pituitary helped to hasten the growth of Phaseolus vulgaris, Zea Mays, Vicia faba, Lupinus albus and Hyacinthus particularly in the earlier stages. Likewise the same investigator found that Evans and Simpson's extract accelerated germination of Triticum vulgare and Zea Mays seeds. Gad-Andresen and Jarlov (4) could not show

*Oklahoma Meeting of the Plant Science Seminar.

increased growth of Hordeum seedlings in earth cultures watered with solutions of folliculin and anterior pituitary hormone. Imshenetskii (5) believes that spore formation in the yeasts and molds he used was stimulated by thyroid preparations (thyreiodin and thyroxin) and rate of reproduction speeded. Janot (6) reported that in experiments using Hyacinths and Convallaria, equiline and equilenine of the mare, folliculine and dihydrofolliculine stimulated growth and earlier flowering. Nehring (7) reviews and discusses the effects of animal hormones upon plant growth and development.

Because of interest in attempts at decreasing the length of the period of dormancy and speeding up growth and development, the series of experiments which are now described were undertaken. The fundamental plan in each series was the growing of a certain number of poplar twigs in definite culture media to which, in some cases, had been added varying amounts of the glandular substances to be tested. The length of the buds was measured and recorded at certain intervals.

Procedure

Culture Solution

The culture solution employed was a modified Knop's Solution made with chemicals obtained from Merck and Company and having the following formula:

$Ca(NO_3)_2$	2.	g.
K_2HPO_4	.5	g.
$MgSO_4$	.5	g.
KCl	.25	g.
*Soluble Ferric Phosphate	11	drops
Distilled water to make	2000	cc.

*50 mg. of Iron phosphate were dissolved in 25 cc. of distilled water and an ordinary medicine dropper was used to add the required amount to the culture solution.

At first the culture medium was made in 2-liter lots, but in the later experiments it was made up in 12-liter quantities. (Other experiments, not reported here, were conducted at the same time.) The pH (colorimetrically determined) was usually around pH 6.2 although in one lot of culture solution pH 6.9 was found. The 12-liter lots were stored in a container covered with black paper.

To the culture solution where required were added the proper amounts (see Table I) of the glandular product to be studied.

Thyroxin solution was made up as follows for each change of the culture medium:

1 mg. of Squibb's Thyroxin crystals was carefully weighed, then placed in 3-3.2 cc. distilled H_2O + 1 or 2 drops of NaOH* then carefully warmed until in solution. By means of a Yale syringe, required quantities were removed and added to the proper bottles containing culture solution.

Antuitrin Growth—"An extract of the anterior lobe pituitary gland containing the growth hormone substantially free from thyrotropic and gonadotropic hormones" was obtained in 20 cc. lots from Parke, Davis and Company. The required amount was taken from the bottle by means of a Yale syringe.

Plants

The plants used were the terminal portions of the basal twigs of the Populus nigra italica. The branches were selected as nearly as possible with an eye for uniformity and health. Each twig was cut so that it was approximately twelve inches long and did not show buds which had started to grow. Five twigs were tested in each bottle of a series.

Glassware

Glassware was cared for in the usual way. Treatment with cleaning solution was followed by many washings in H_2O—in the last two or three of which distilled water was employed. Ordinary half-pint milk bottles were used to hold the culture solutions in which the plants were growing.

Method

On the selected day for the beginning of each series, the required number of poplar twigs were obtained, cut to size and washed. The bottles had previously been prepared and just before adding the proper number of plants per bottle, each bottle received its necessary culture medium plus, in some cases, glandular products according to the predetermined plan. Each bottle received 50 cc. of culture solution. The plans of the three series follow:

*Weak sodium hydroxide was made by dissolving 3 pellets in 10 cc. distilled H_2O.

Series I

TABLE I

Row I	Row II	Row III	Row IV
1e ○	2e ○	3e ○	4e ○
1d ○	2d ○	3d ○	4d ○
1c ○	2c ○	3c ○	4c ○
1b ○	2b ○	3b ○	4b ○
1a ○	2a ○	3a ○	4a ○
Each bottle received 50 cc. culture medium (+5 twigs)	Each bottle received 50 cc. culture medium + .2 cc. Antuitrin Growth (+5 twigs)	Each bottle received 50 cc. culture medium + .2 cc. Thyroxin solution made in way specified (+5 twigs)	Each bottle received 50 cc. culture medium + .2 cc. Antuitrin Growth + .2 cc. Thyroxin solution (+5 twigs)

Average length of the buds in any row of any series was determined by adding the measured lengths of all the growing buds on the twigs in the five bottles of that row and dividing the sum thus obtained by the number of growing buds.

Series II and Series III

Series II contained, in addition to duplicating the above-explained Series I, a set of five bottles containing each 50 cc. culture medium plus .4 cc. of Antuitrin Growth. The composition of the rows of Series III is shown in Table III. In the row marked "2x thyroxin," each bottle received .4 cc. of the thyroxin solution.

The five poplar twigs were suspended by means of a cotton plug in the mouth of each bottle so that they did not come to rest upon the floor of the bottles, yet their cut ends were immersed in the growth solution. The bottles in each series were then placed in a room whose temperature was as constant as we had, and located on a table near a window so that sunlight might be available. During the experiment with each series, the relative positions of the rows composing the series were changed so that all had more nearly the same growing conditions. A study of the data of Series I and II laterally showed that the position of the bottles nearest the window did not materially (at least at first) influence either average length or number of buds growing. Series III was not studied in this way (laterally).

The culture solution of the bottles was changed a number of times for each series, according to the following table:

TABLE II

Series I	Series II	Series III
December 5	January 20	March 4
December 15	January 29	March 14
December 27	February 10	March 23
January 8		

Care was taken at every change that the plants in the bottles were not injured. Each bottle was washed, refilled and the twigs occupying that bottle replaced as speedily as possible. (Thyroxin solution was made up freshly each time it was employed either at the start of a series or at a change.)

It was attempted to read the entire series at each reading period. In one or two cases, readings had to be continued the following day. It was necessary to establish certain rules in taking the readings. The procedure was as follows: (1) The buds were measured from base to the tip by means of a millimeter rule—estimations being made to the nearest millimeter. (2) When buds were just beginning to grow or were ready to start, it was often very difficult to decide whether they should be counted or not. I followed the rule of counting those buds in which a decided green color was noticeable. (3) When the buds were expanding or had fully expanded, measurements were made from the line where the bud had joined the shoot to the apex of the longest leaf which was pulled into position so that the axis of the bud derivatives represented a straight line. Great care was used in attempting to treat each series in the same way.

Some Sources of Error

It is perfectly evident that there are many sources of error, but attempts have been made in all cases to expose the members of each series to the same conditions except for the presence of the substance to be tested in some of the bottles. Since these are the initial experiments, it is hoped that certain causes of error may be eliminated in future series as experience and facilities permit. Among the sources of error are the following:

1. Variations in room temperature at which the plants in the three series were grown (as much as 10° C.).

2. Variations in light received by the plants in a series.

3. Variations in nutrient solutions although I hope these were slight, as great care was used in their preparation.

4. Lack of knowledge of what constitutes an optimum culture medium for the twigs employed under conditions of the experiment.

5. Buds were measured by a ruler calibrated in millimeters, and I am not certain that my criterion of measurement from the base of the bud to the tip of the longest proliferation from that bud moved into a straight line is a justifiable one.

6. I have not been able to know just how much of the added glandular product was actually taken in (and utilized) by the plants.

7. It would have been better to have employed the same intervals in the three series between periods of measurement (which unfortunately I was unable to do) and also to have changed the growth media more frequently.

Summary

Analysis of the data obtained from the three series points to the following summary:

1. If we refer to the average length as a criterion, under the conditions of the experiments, (a) Antuitrin Growth and thyroxin both seem to have a stimulating influence in a very general way (Graphs 1, 2, 3) (Table III); (b) in Series II and Series III, thyroxin seemed to produce more of a stimulating effect than Antuitrin Growth; (c) Antuitrin Growth, however, appeared to be slightly more stimulating in the earlier stages of Series II and III.

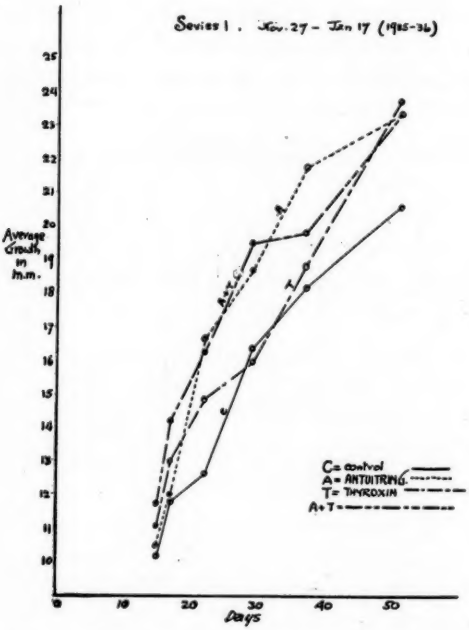
2. If we refer to numbers of buds stimulated as a criterion, we find that in a general way in Series I, Antuitrin Growth seemed to have a pronounced accelerating effect; in Series II, the effect of Antuitrin Growth somewhat (with the exception of 2 x Antuitrin Growth), and most particularly thyroxin, seemed to be a retardation of the number of buds stimulated, and in Series III, thyroxin seemed to have a definitely stimulating influence.

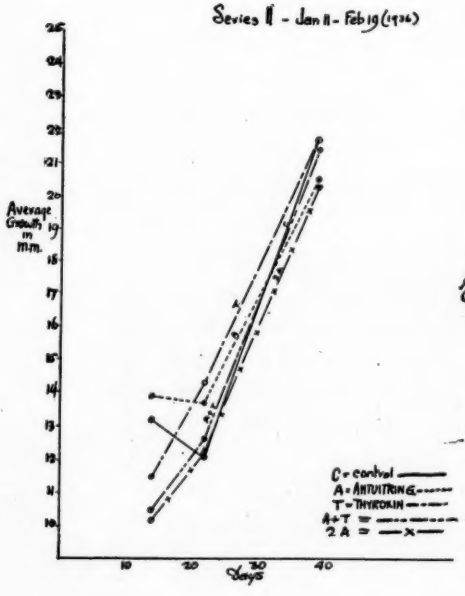
3. As a rule, from the few observations made, roots seemed to form more readily upon the cut twigs in the culture medium

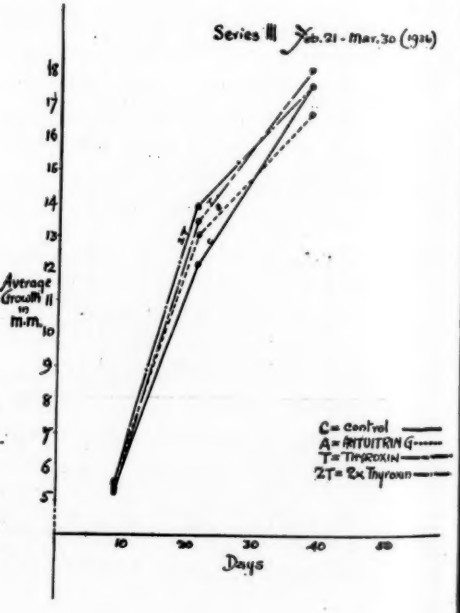
TABLE III

COMPARISON OF THE NUMBER OF BUDS SHOWING SIGNS OF GROWTH IN THE THREE SERIES AT VARIOUS TIME INTERVALS. THE LOWER FIGURE OF EACH PAIR REPRESENTS THE AVERAGE LENGTH IN mm. PER BUD (Closed or Open).

	Series I				Series II					Series III			
Days	Control	Antuitrin Growth	Thyroxin	Ant. and Thy.	Control	Antuitrin Growth	Thyroxin	Ant. and Thy.	2 X Antuitrin Growth	Control	Antuitrin Growth	Thyroxin	2 X Thyroxin
9										46 5.4	61 5.6	75 5.8	90 5.5
14					34 13.2	30 13.9	11.5	34 10.5	34 10.2				
15	9 10.2	15 10.5	11 11.1	16 11.75									
17	11 11.8	20 12.0	12 13.0	18 14.2									
21								—		178 12.2	170 13.1	209 13.5	200 13.9
22	17 12.6	20 16.7	14 14.9	21 16.3	125 12.1	119 13.7	106 14.3	116 12.6	156 12.2				
29	19 16.4	28 18.65	21 16.	25 19.5									
37	30 18.2	33 21.8	30 18.8	40 19.8									
38										189 17.6	204 16.7	218 18.1	212 17.6
39					172 21.7	160 20.5	129 21.7	147 21.4	162 20.3				
51	50 20.6	53 23.4	53 23.75	63 23.40									


Series I. Dec. 27 - Jan 17 (1925-26)
Average Growth in m.m.
Days
C= control
A= ANTUITRIN G.
T= THYROXIN
A+T


Series II - Jan 11 - Feb 19 (1926)
Average Growth in m.m.
Days
C= control
A= ANTUITRIN G.
T= THYROXIN
A+T
2 A


Series III Feb. 21 - Mar. 30 (1926)
Average Growth in m.m.
Days
C= control
A= ANTUITRIN G.
T= THYROXIN
2T= 2x Thyroxin

containing the thyroxin than they did on the twigs in culture medium containing Antuitrin Growth.

It must be remembered that Series I was started in late fall, Series II in early winter and Series III in late winter. The stage of dormancy as well as other factors must play a big rôle in the results of these experiments. The last two weeks of January and the month of February were severe. Series III (started February 21) showed that while the number of buds showing signs of growth was far greater (as we would expect since the period of winter dormancy was ending), the temperature conditions might have been reflected in a decreased average growth—at least in the initial days of this series.

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TEXTS FROM THE TEXTILE TRADES

By Ivor Griffith, Ph. M., Sc. D., F. A. I. C.

Wherein the Author challenges research workers in pharmacy to explore these fallow fields, already cultivated by the textile trades, but scarcely touched by those who garner grain for the health and the heal of the commonweal.

MANY substances having medicinal value and pharmaceutical interest, have also wide technical applications that take them far afield from therapy and pharmacy. Thus, sodium sulfate, a splendid laxative, whether sold for a song as glauber salt, or sold for a fortune in the form of "crazy crystals", has a thousand-fold greater use as a dyeing adjunct than it has in medicine. Whether there is any fundamental correlation between its operation in both fields is of no particular consequence. But, strange as it may seem, there are many substances, new and old, used in the textile trades, whose medicinal and other virtues have, for various reasons, never been studied. This is particularly true of new products which find in the textile industries a freer, fuller sale than ever they could find in the smaller fields of pharmacy and medicine. Consequently, the study of their potential or actual merits, or their practical use in the diversified fields of pharmacy, is often overlooked or avoided, even by the manufacturers themselves.

Moreover it is likely that pharmaceutical and pharmacological workers are too often restricted to their own scant horizon, contemplating for medicinal or other use only those substances which openly carry a savor or a flavor of therapy.

In any event, it is manifest that many substances, creatures of chemical research, are detoured to the textile industries without even a chance for their evaluation as agents of healing, or as useful instruments in other fields of practice.

This brief presentation, accordingly, describes a series of these new and neglected things, and suggests that someone, somewhere, may find time to give them the study they seemingly deserve, and to point out the purposes which they will eventually serve, whether as medicines or else in other useful fields.

Textile Assistants

Under this general caption we consider the modern versions of the old turkey red oil and miscible sulfonated oils, of foul aroma, used in the horse-and-buggy days to help in what the textile worker still calls the "wet down".

The penetration of water into textile tissues is not always an easy achievement. The farmhand would explain the floating of a duck feather on the pond by stating that it was covered with grease and hence could not do else than float. The professor would explain the same proposition by stating that it was all a matter of surface tension, and by the time he would involve into his explanation, dynes and temperature, to say nothing of the variants supplied by colloid dispersions of silica and duckdirt in the pond, the listener would find it far more simple to believe in the rustic's ready answer.

For after all, the feather *could* be made to sink even in duck pond water, not just by degreasing the feather, but also by increasing the penetrability of the water, or "by reducing its surface tension". In the textile industries this is an important factor in the water processes. Reducing the surface tension of water can be done in many ways. Heat does it. So does soap. Indeed, this is one reason why soap is the cleanser that it is. Glycerin, alcohol and many similar chemicals make water more penetrating and permeating.

In the textile trades, soaps of all kinds have been used for centuries to assist penetration, for scouring, fulling, dyeing, etc. But soap has its disadvantages, especially with hard water or acid water, or in the presence of certain chemicals. It produces precipitates which fall on the textile and blemish it—as scum or insoluble soaps, and besides, its water solution is quite alkaline.

Sulfonated oils are a relatively recent substitute for soap. They have had, and still have, a multitude of worth-while applications in the trade as penetrators, dye-levelers, softeners, etc., reducing the surface tension of water to an appreciable extent, and introducing (when ideally constituted and applied) none of the scum or other defects so often produced by textile soaps. And they are rather harmonious with industrial chemicals, acids, etc.

Still more recently, however, there have been introduced as new surface tension reducers, in the form of powder, paste or solution, a variety of salts of sulfated esters of the higher aliphatic alcohols such

as lauryl and oleyl alcohols, which are related chemically to the fatty acids from coconut oil.

The sulfonation is carried out in such a manner as to yield alcohol sulfuric acid esters and alkali salts of a general formula $R.OSO_3Na$.

$C_{12}H_{25}OH$ plus H_2SO_4—$C_{12}H_{25}SO_4H$ plus H_2O
$C_{12}H_{25}SO_4H$ plus NaOH—$C_{12}H_{25}SO_4Na$ plus H_2O

The properties of the fatty alcohol sulfonates change considerably as the number of carbon atoms increase in the homologous series $C_nH_{2n}+1.SO_4Na$.

These splendid products are now commercially available under patented names. Their textile uses are manifold. Their pharmaceutical, cosmetic, and medical uses, however, are as yet rather undetermined, although a few products exhibiting them are now on the market.

The various forms of gardinol or dupanol are splendid cleansers and emulsifiers. They are derived from lauryl and oleyl alcohols, respectively, and are excellent detergents possessing extraordinary properties for products in this category. The derivatives of meristoyl, cetyl and stearyl alcohols are more adapted to softening and finishing processes rather than for cleansing.

In toothpastes, shampoos, emulsions, dispersions, polishes, alkali-free cleaners, etc., they are superior to soap. An instance of their value is manifest in this cleaner for painted surfaces, enamelled walls and woodwork where the following simple preparation works cleaning wonders without affecting the gloss at all.

Gardinol W A	2 ounces
Gelatin	1 ounce
Water—to make	2 gallons

Soak the gelatin in a pint of water overnight, and incorporate with the gardinol dissolved in the rest of the water. This fluid needs no dilution. Gardinol W A is a white powder, costing about fifty cents per pound.

Other products of a similar nature are Deceresol and Alphasol, in various concentrations. These are said to be by-products of the manufacture of phthalic anhydride and are quite far removed from the gardinol type, thus allowing their use in preparations where unfair existing patents interdict the use of the lauryl and oleyl esters.

The OT variety of Deceresol, by far the most powerful of the series, has tremendous wetting power. Its wetting power is based not only on the great reduction in surface tension of the solution itself, but also on the lowering of interfacial tension between the solid and solvent, thus permitting rapid penetration of the fibre.

The fluid concentration (about 10 per cent. in water) is available for about twenty cents per pound, and it is satisfactory for most purposes in a 1 per cent. solution. The base material is more expensive ($1.50 per pound), and dissolves in water with difficulty, although the addition of 10 per cent. butyl carbitol facilitates solution.

The value of these wetting agents is very closely related to the effect they have on the surface tension of liquids in which they are dissolved. The following table illustrates the reduction of the surface tension of water by small quantities of the above series, as determined by the static method with a DuNouy Tensiometer, at 25 C.:

Concentration of Wetting Agent:	(Water) 0.0 %	0.1%	1.0%	
Alphasol OT	72	29.3	25.3	dynes per cm.
Alphasol MA	72	38.8	31.5	" " "
Alphasol OS	72	37.5	34.8	" " "

(Gardinol or Dupanol may be secured from the DuPont Dyestuffs Division, Wilmington, Delaware, the National Aniline and Chemical Company, and from other sources; the Deceresols and Alphasols from the American Cyanamid & Chemical Corporation, New York City. Tergitol is a similar product offered by the Carbide and Carbon Chemicals Corporation of New York.)

All these products have real value in the skin absorption of medicinals, as liniments, lotions, etc., and perhaps for that matter, as the saponins operate—in the dispersion or in the synergistic activation of drugs in the body. In any event the pharmacologists have been altogether too tardy in contemplating their possibilities as agents of therapy.

The assistance which these substances afford in pushing the dyestuff into the substance of the textile staple, no matter how compact it may be, suggests that they might be useful in facilitating the staining of bacteria or tissues in the pathological laboratory. (They are!!)

So too, might they be of real value in assisting the penetration of the bacteriostatic dyestuffs such as malachite green or mercurochrome, or, as a matter of fact, in assisting the penetration into living tissue of many antiseptic or analgesic chemicals.

A splendid practical test of their dispersing value is demonstrated by dipping a piece of white felt (Fig. 1, a and b) into a weak solution

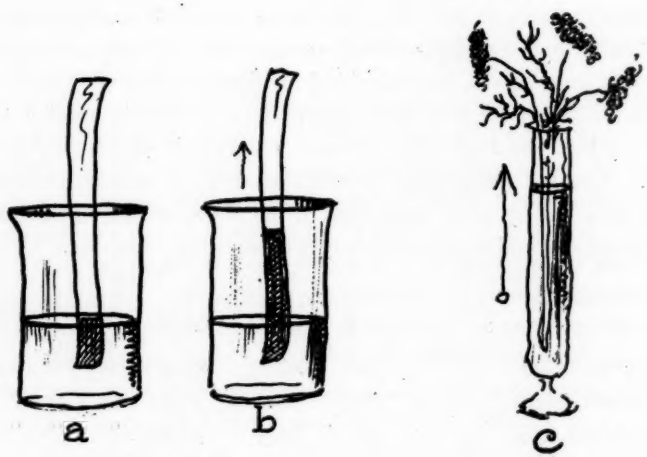

Fig. 1

of dyestuff (such as *fast fuchsin 6B*) and a similar piece into a similar solution to which has been added 2 per cent. of deceresol OT (10 per cent. solution). The dye solution will almost instantly creep up the felt immersed in the latter liquid, while no such effect is noted in the other liquid.

Likewise the solution containing the dispersing agent behaves quite differently from the other when a drop of each is placed on the back of the hand, the dispersing effect being very noticeable.

Suprarenalin solution to which is added a small percentage of the compatible dispersing agent when applied to the skin will show a prompt blanching without scarifying the surface and when a scratch is subsequently made the solution containing the dispersing material shows a prompter action, the blood cells, within the capillaries,

scampering away before the suprarenal hormone, leaving the area as white as a shroud.

An aqueous dental anæsthetic solution speeded up its action remarkably when 2 per cent. of deceresol OT was added to it.

The coal tar analgesics, acetanilid, acetophenone, amidopyrine—the pain killers, procaine, cocaine, etc., may be synergized to action when applied to unabraded skin surface. Indeed there is definite evidence that these wetting agents in themselves possess some anaesthetic value, although they are at the same time not without irritation to mucous tissue. These are matters suggested for study.

Certainly we are challenged to such study with these remarkable textile agents, and as certain are we to find their special merits in the field.

Know, however, that some of the large manufacturers are already well aware of their uses and are now exploiting them as wonders of the age. Under coined names, such as irium, drene, etc., they are spectacularly advertized and strangely enough some are protected for specific use by letters patent!

As soap replacers in pharmaceutical, cosmetic and toilet preparations, dentifrices, shampoos, etc., and even in insecticides, they have already taken their place. One of the outstanding dentifrices contains one of these products instead of soap and a largely advertised shampoo ballyhoos its unique composition, though it represents nothing but a solution of one of these detergents.

An enterprising pharmacist has recently built up a splendid trade with a delicately colored and scented phenol antiseptic which he sells to replace the dark and malodorous compound cresol solution for personal hygiene purposes. He does not—and cannot—call it white lysol, but he has given it a catchy name. Such a preparation has merit and appeals to the discriminating. A suitable formula is as follows:

Gardinol WA	25 Gm.
Glycerin	100 Gm.
Phenol (liquefied)	250 cc.
Water—to make	1000 cc.

Color a pale lavender with Violamine (Ciba). Perfume to obscure the phenol odor.

Incidentally phenol crystals may be permanently liquefied and rendered soluble in water through the agency of 10 per cent. of ceresol OT base, dissolved with heat in the fused crystals. The same thing is true of cresol. Of course glycerin or soap in sufficient amounts will accomplish the same purpose.

Even benzine or kerosene, despite their low viscosity, may be made completely practically *soluble* in water by incorporating in them the above-named base.

Cut flowers (wild carrot or Queen Anne's lace, snowball flowers or *hydrangea paniculata,* etc.) may be colored with fine effects (Fig. 1, c) by immersing them in water to which is added the penetrant and appropriate dyestuffs (rhodamines for pink, alphazurines for blue, and tartrazines for yellow).

It is obvious, however, that a study must also be made of their pharmacologic properties, particularly their toxicity, before they are indiscriminately used, for it is charged that a few individuals display toward some of them a most unfortunate skin idiosyncrasy. The writer is informed that such a study is now under way in one of our universities. The sooner its findings are made known, the better it will be for progress in this field.

Fluorine Products

Few other than the initiated know the widespread use of fluorine compounds in the textile or other industries. Following is a brief recital of their applications.

(a) As moth preventives—Silico-fluorides or other fluorine compounds are used to moth-proof textiles, either by immersion or by spraying onto the finished material.

(b) As rust removers—Erusto Salts (Sterling Products, Easton, Pa.) used as an iron removing sour salt in the laundry trade—is an example of such use. *Erusticator,* by the same company, is a fluorine compound, and it too is an iron rust eradicator.

(c) As tile cleaners. Ammonium bifluoride is a splendid, though active, cleaner of tile walls and particularly tile floors. One commercial product uses a starch and bifluoride combination.

(d) As stabilizers in peroxide bleach baths.

(e) As insecticides and rodent killers.

The following is a splendid roach exterminator:

Sodium fluoride, commercial	1 pound
Sugar	1 ounce
Powdered dried cheese	1 ounce

Mix intimately.

Note: This is a powerful poison.

The Less-Familiar Phosphates

Calgon. This is a water-soluble form of sodium hexametaphosphate $(NaPO_3)_6$, commercially available only since about 1930, when it was developed on a commercial scale by the famous Mellon Institute. It is a splendid water softener and detergent, having a diversified application in the textile field. Lime and magnesium salts are peculiarly tied up, by it, so that they remain soluble, yet inactive. As a soap assistant or as an adjuvant to non-soap cleaning agents there is nothing quite like it. A little of it in the bath water, no matter how hard the water, or dirty the bather, the tell-tale ring is never evident. Liquid soaps which are difficult to maintain in a transparent form are pellucid and brilliant when just enough calgon is added to the water. Buromin, Calgonite, Calex and Calgolac are all variants of Calgon. For this product there *must* be a place in the pharmaceutical field, even beyond its present uses. (Available from Calgon, Inc., Pittsburgh, Pa.)

Tri-Calcium Phosphate $(Ca_3(PO_4)_2)$ Precipitated.

This is a tasteless, pure white, finely divided material of exceptional purity. Two grades are available, namely, the *regular* grade—a precipitated and air-separated material, used principally as a conditioner for salt and sugar to prevent caking; and the *dense* grade—a more finely divided material of greater density than the "regular" but otherwise the same. Used as a polishing agent in tooth pastes and powder. Efficient, yet soft enough so as not to scratch. It is far superior to calcium carbonate in tooth paste or powder.

Tri-Sodium Phosphate $(Na_3PO_4.12H_2O)$.

This is a brilliant white, free-flowing powder easily soluble in water. It is available in four grades: chip, flake, fine, and powdered. Uses: tri-sodium phosphate, because of its emulsifying and detergent properties, is one of the best cleaning compounds known. It is noted

for the efficiency with which it softens hard water. These three properties have made it a universally favored ingredient in popular packaged brands of household cleansers. Recommended for washing dishes, painted, varnished, or enameled surfaces, metal fixtures, fabrics, porcelain, linens, and even an oily garage floor. Gives a characteristic sparkle to glassware. Because of its efficiency it can be used in smaller quantities than other cleansers, and without the application of high temperatures. Easily rinsed from hard surfaces and fabrics.

Pharmacists are not generally aware of the unusual properties of this chemical, nor of the fact that most of the cleaners sold at fancy prices are largely this readily available and inexpensive salt alone or mixed with sal soda.

Peroxide of Hydrogen, 100 Volume

This diluted chemical, used cosmetically to give gentlemen their preferences, has a much wider use in the textile field. Millions of gallons are used annually for bleaching all kinds of textile staples. The textile product, ten times as strong as the U. S. P. liquid, is made electrolytically and costs, on contract, less than 18 cents per pound. From this concentrate and water, may be made for less than 15 cents per gallon, a product that is to all intents and purposes quite official. This strong product (100 volume) should be studied pharmacologically. It is escharotic and a powerful bleach. By the way, the beauty parlor has improved its bleaching technic, so that hair so bleached no longer looks like a burlap bag. Ammonia or other alkali activates peroxide, but the catalyst that energizes it the most is a lead salt in solution, or a salt of iron.

Let one who is interested try this simple experiment. Pour a small quantity of solution of hydrogen peroxide (U. S. P.) into a beaker. Add a few drops of ammonia water to activate it. Follow with a few drops of lead acetate solution and note how rapidly the oxygen makes its exit.

The removal of moles and melanin disfigurations on the body is possible through the use of such a catalytic technic, very carefully done. One mole of large area disappeared under extremely cautious handling in this fashion: The site was scrubbed with ether, on a pledget of cotton, to remove grease. A very weak solution of iron sulfate, followed by a 5-volume peroxide, alkalinated with aromatic spirit of ammonia, concluded the daily treatment. A scab formed in a week

or so which, when it loosened itself, took with it much of the pigment. (Buffalo Electric Co. of Niagara Falls, or DuPont, Wilmington, Del., supply this 100-volume product.)

Trigamine

Triethanolamine has been used for years in making certain textile soaps, replacing caustic soda or potash. Now comes Trigamine, an improvement over it. Its composition is not divulged, although it is more than likely a glycol amine. Trigamine is a liquid, almost water-white in color, with a pleasant odor. It is somewhat more viscous than Triethanolamine and is completely soluble in water, glycols, glycerine and 50 per cent. alcohol. It is immiscible with organic solvents. It is non-hygroscopic at ordinary humidities and non-volatile up to 100 C. Trigamine forms soaps with the usual fatty acids such as stearic and oleic. Such soaps do not darken or yellow with age. Trigamine Stearate, for example, is a hard white wax-like solid which remains white over a long period of time. Trigamine Oleate is a liquid and not gelatinous. Emulsions made with Trigamine Stearate are white and stable and do not discolor even on long standing. Trigamine is less alkaline than Triethanolamine, a 10 per cent. solution in water having a pH of 9.7. It can be used as a dispersing agent for casein and shellac in water, replacing alkalies and giving a much more flexible film. Emulsions made with Trigamine are of interest in textiles, paper, leather, cosmetics, agricultural sprays, polishes and many other industries. The following formulas are examples of trigamine in use:

Milky Hand Lotion

Mineral oil	88 grams
Stearic acid	8.5 "
Trigamine	3.5 "
Water	100 cc.

The trigamine is dissolved in the water. The stearic acid is melted in the mineral oil and the oil mixture added slowly with high speed agitation to the water solution of trigamine. Perfume is added as the emulsion is cooling. This gives an exceptionally stable emulsion, which will retain its brilliancy and whiteness for a long period of time.

Kerosene Hair Wash

A.	Deodorized kerosenee	50 grams
B.	Trigamine	20 "
C.	Rosin X	15 "
	Oleic acid (white)	15 "

Melt (C) with high speed stirring. Add (B) at 85° C. Stir thoroughly. Turn off heat and add (A) and stir. This gives a clear liquid which, when added to water, gives a practically transparent product.

Floor Polish

The following formula gives a rubless floor polish characterized by high initial lustre and durability:

Carnauba wax No. 2	120 grams
Oleic acid	13.7 "
Trigamine	19 "
Caustic soda (47%)	2.3 "
Water	845 cc.

Melt the wax in the oleic acid, add trigamine and heat to 90° C. Then add the caustic soda and 25 cc. of water at about 95° C. Stir until a gel is formed. Then add the rest of the water which must be boiling. Stir thoroughly till cool.

Salicyl Anilide

A research group, recently searching for an anti-mildew or a fungicide for use in a pharmaceutical house product, entirely overlooked the above material in their early work. Shirlan, or salicyl anilide, soluble in water only to the extent of .005 gm. to the 100 gm., yet effective in that concentration, has long been used in the textile trade. It proved the answer to the aforementioned query.

The new solvents and many of the useful dyestuffs which have found such a wide use in the industries, are still strangers to the pharmaceutical field. They constitute so various a range that their nature and properties deserve special consideration in a later article.

Meantime enough has been stated to suggest to the inquisitive that there is much that can be learned from sources remote to our own restricted, well-exploited fields.

VARIATIONS IN THE ELECTROPHORESTIC BEHAVIOR OF GELATIN PROTECTED SILVER HALIDE SOLS

By L. F. Tice and W. G. Batt*

The purpose of this paper is to explain how gelatins, depending upon their source but particularly upon their method of preparation, may exhibit distinctly different physico-chemical properties.

GELATIN has long been recognized as a most efficient protective colloid and it has been used to confer stability on many different kinds of hydrophobic material.

The purpose of this paper is to present certain experimental phenomena in order to illustrate a point not fully appreciated by many scientific workers, namely, that there exists two commercially available types of gelatin which are decidedly different in their physico-chemical properties and capable under certain conditions of producing almost opposite results, depending upon which type of gelatin is employed.

In the manufacture of gelatin one of two general procedures is followed. First, a precursor may be subjected to a prolonged liming treatment followed by washing, adjusting the pH to between 5 and 7 and finally extracting the collagen by a carefully controlled hydrolysis. A gelatin of this type will be referred to in this paper as "Type I." The other method which is employed consists of a preliminary "acid-plumping" of the precursor followed by washing until the pH rises to 3.5-5 and finally extracting by a regulated hydrolysis. A gelatin of this type will likewise be referred to in this paper as "Type II." Obviously, the nature of the precursor determines the preliminary treatment which it usually receives and thus a bone gelatin as a rule may be taken as an example of Type I and a porkskin gelatin as an example of Type II. However, it is entirely possible to prepare a gelatin of either type starting with any precursor, inasmuch as it is the treatment given the precursor which is the determining factor. Briefer and Cohen (1) have reported the difference in the isoelectric points of a gelatin derived from a prelimed precursor and a gelatin from an acid-treated precursor. Using the turbidity maxima as indicative of the isoelectric points they found the former to possess an

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isoelectric point falling in the region pH 5 and the latter in the region pH 8.

Silver halide hydrosols are classic examples of hydrophobic material which may be protected by the use of gelatin. The unprotected silver halide sol, e. g., a hydrosol of silver iodide, is negative when it is prepared with a slight excess of iodide ions and positive when there is a slight excess of silver ions. These two types of silver iodide hydrosols were selected for the experimental work in which each of the two was prepared in the presence of gelatin Type I as the protective colloid and a second set in which gelatin Type II was the protective colloid. All four hydrosols were varied over a range of pH and the charge on the colloid particles determined at the various pH levels using a Northrop-Kunitz electrophoresis assembly with 180 volts potential difference across the electrodes. The results are tabulated as follows:

Hydrosol of Silver Iodide (excess I—) Protected with 0.1% Gelatin

	Type I	pH	Charge
#1	50 cc. + 0.2 cc. N/100 HCl	$5.2\bar{0}$	—
#2	50 cc. + 0.3 cc. N/100 HCl	$5.1\bar{0}$	—
#3	50 cc. + 0.4 cc. N/100 HCl	$5.0\bar{5}$	—
#4	50 cc. + 0.5 cc. N/100 HCl	$5.0\bar{0}$	—
#5	50 cc. + 0.6 cc. N/100 HCl	$4.9\bar{5}$	—
#6	50 cc. + 0.7 cc. N/100 HCl	$4.9\bar{0}$	—
#7	50 cc. + 0.8 cc. N/100 HCl	$4.8\bar{0}$	isoelectric
#8	50 cc. + 0.9 cc. N/100 HCl	$4.7\bar{0}$	+
#9	50 cc. + 1.2 cc. N/100 HCl	$4.5\bar{5}$	+
	Type II	pH	Charge
#1	50 cc. + 1.0 cc. N/100 NaOH	$5.9\bar{0}$	+
#2	50 cc. + 1.2 cc. N/100 NaOH	$6.2\bar{0}$	+
#3	50 cc. + 1.4 cc. N/100 NaOH	$6.5\bar{5}$	+
#4	50 cc. + 1.6 cc. N/100 NaOH	$6.8\bar{5}$	+
#5	50 cc. + 1.7 cc. N/100 NaOH	$7.1\bar{5}$	+
#6	50 cc. + 1.8 cc. N/100 NaOH	$7.3\bar{0}$	+
#7	50 cc. + 1.9 cc. N/100 NaOH	$7.5\bar{0}$	no
#8	50 cc. + 2.0 cc. N/100 NaOH	$7.8\bar{0}$	migration
#9	50 cc. + 2.1 cc. N/100 NaOH	$8.1\bar{0}$	observed
#10	50 cc. + 2.2 cc. N/100 NaOH	$8.3\bar{0}$	—
#11	50 cc. + 2.3 cc. N/100 NaOH	$8.6\bar{0}$	—
#12	50 cc. + 2.4 cc. N/100 NaOH	$8.9\bar{0}$	—

The silver iodide hydrosol with an excess of iodide was negative when protected with 0.1 per cent. gelatin Type I at any pH above 4.8, its isoelectric point, and positive at any pH below 4.8, whereas the same hydrosol protected with 0.1 per cent. gelatin Type II was positive at any pH below 7.5 and negative at any pH greater than 8.1. No charge was observed between pH 7.5 and 8.1.

In the next tabulation the results obtained using a silver iodide hydrosol containing an excess of silver ion and protected with both types of gelatin are presented.

Hydrosol of Silver Iodide (excess Ag+) Protected with 0.1% Gelatin

	Type I	pH	Charge
#1	50 cc. + 0.2 cc. N/100 HCl	5.30	—
#2	50 cc. + 0.3 cc. N/100 HCl	5.20	—
#3	50 cc. + 0.4 cc. N/100 HCl	5.10	—
#4	50 cc. + 0.5 cc. N/100 HCl	5.00	—
#5	50 cc. + 0.6 cc. N/100 HCl	4.95	—
#6	50 cc. + 0.7 cc. N/100 HCl	4.90	—
#7	50 cc. + 0.8 cc. N/100 HCl	4.80	isoelectric
#8	50 cc. + 0.9 cc. N/100 HCl	4.70	+
#9	50 cc. + 1.2 cc. N/100 HCl	4.60	+
	Type II	**pH**	**Charge**
#1	50 cc. + 1.0 cc. N/100 NaOH	5.60	+
#2	50 cc. + 1.2 cc. N/100 NaOH	5.95	+
#3	50 cc. + 1.4 cc. N/100 NaOH	6.30	+
#4	50 cc. + 1.6 cc. N/100 NaOH	6.70	+
#5	50 cc. + 1.8 cc. N/100 NaOH	6.85	+
#6	50 cc. + 2.0 cc. N/100 NaOH	7.15	+
#7	50 cc. + 2.1 cc. N/100 NaOH	7.40	+
#8	50 cc. + 2.2 cc. N/100 NaOH	7.60	no migration observed
#9	50 cc. + 2.3 cc. N/100 NaOH	7.80	
#10	50 cc. + 2.4 cc. N/100 NaOH	8.00	
#11	50 cc. + 2.5 cc. N/100 NaOH	8.25	—
#12	50 cc. + 2.6 cc. N/100 NaOH	8.50	—

The results here are practically identical with those just presented illustrating that the intrinsic charge of the basic sol is more

than offset by the effect of the gelatin which is added as the protective colloid. Attention is drawn to the fact that below pH 4.8 and above pH 8.1 both gelatins behave qualitatively the same conferring a positive charge on the hydrophobic particles below pH 4.8 and a negative charge above pH 8.1. However, between these limits of pH 4.8 and 8.1 the charge conferred on the particle will be positive or negative depending upon the type of gelatin employed. This is illustrated in the following diagram. (Fig. I.)

The Charge on Gelatin Protected Silver Iodide Sols

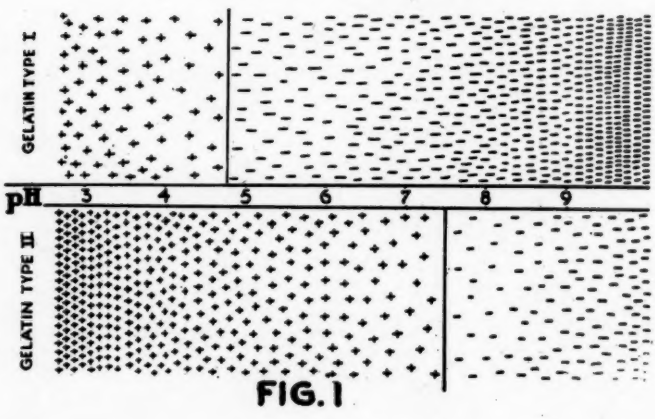

FIG. 1

Inasmuch as the range pH 4.8-8.1 covers a rather wide zone it would seem that this difference in behavior between the two types of gelatin as a protective colloid would be of great importance. Simply by choosing one or another type of gelatin either a positive or a negative colloid is available.

Practically all of the investigations in the past involving gelatin have been carried out with one type of gelatin only. Consequently, it is entirely possible that many results which have been obtained are not conclusive until this wide difference in the two types of gelatin is properly appreciated and incorporated in such experimental work.

The Mutual Flocculation Phenomenon

It has long been observed by numerous workers in the gelatin industry that very small amounts of a gelatin derived from an acid-treated precursor (Type II) when present in a gelatin derived from a prelimed precursor caused marked changes in the product. Instead of the sample producing a clear gel in a concentration of 2-5 per cent., as would be the case with either gelatin alone, a very turbid gel resulted.

The authors have conducted an investigation in order to find a satisfactory explanation for this interesting observation. The first step was the preparation of ash-free gelatins of both types. Gelatin from a prelimed precursor was de-ashed employing the method of Loeb (2) and gelatin from an acid-treated precursor was purified by soaking a commercial granulated product in N/100 NaOH kept at a temperature below 5° C. for one hour, followed by subsequent soaking of the gelatin for several hours in distilled water kept at the same temperature and renewed several times. The gelatin was then allowed to drain, dehydrated with alcohol and finally dried in an oven. Both of the purified gelatins gave a negligible amount of ash upon ignition.

In order to learn whether certain inorganic salts present in the commercial gelatins were involved in the production of turbidity upon mixing, these ash-free gelatins were then adjusted to the same pH as that of the original stock, a blend containing a small amount of the gelatin from an acid-treated precursor made, and a 2 per cent. gel prepared. A very turbid product resulted identical to that which was produced with the gelatins not specially purified.

This seemed to indicate that the inorganic substances present in the commercial stock were not components of the precipitate causing turbidity and that, in all probability, the phenomenon was colloidal in nature involving in some manner the gelatins themselves.

The isoelectric point of the gelatin from a prelimed precursor (gelatin Type I) was found to be 4.8 both by the method of the turbidity maximum and electrophoretic behavior. The gelatin from an acid-treated precursor (gelatin Type II) gave a broad zone for

turbidity maximum but gave an isoelectric point at approximately pH 7.5 on the basis of its electrophoretic behavior.

On the basis of this known difference in the electrical properties of the two types of gelatin, a tentative explanation of the turbidity phenomenon was evolved which was subjected to experimental proof. The apparent mechanism was as follows: Gelatin of Type I as generally sold on the market has a pH from 5.4-6.6 and it is in this pH range a weakly negative colloid, since it lies on the alkaline side of its isoelectric point but not greatly removed from it. Gelatin of Type II, on the contrary, is sold at a pH from 3.8-4.8 and it is in this pH range a very highly positive colloid inasmuch as it lies a relatively great distance on the acid side of its isoelectric point. Consequently, when a small amount of gelatin Type II which is highly positive is mixed with a large amount of gelatin Type I which is weakly negative a mutual flocculation ensues by colloid neutralization.

This would explain why as little as a few tenths of 1 per cent. of gelatin Type II added to the gelatin Type I would produce such a marked turbidity.

In order to test this reasoning it was seen that if this theory were true then at a pH level below the isoelectric point of gelatin Type I (pH 4.8) and above the isoelectric point of gelatin Type II (approximately 7.5) any mixture of the two gelatins would be perfectly clear, since both would possess the same sign of charge. Experimentally, this was found to be the case, the breaking point between turbidity and clarity falling quite sharply at the lower pH value but not so sharply at the upper pH value due to the broad range of turbidity possessed by the gelatin Type II alone in this region.

It was furthermore found that no clear blend of the two types of gelatin could be made between the limits pH 4.8 and pH 7.5 as quite obviously between such limits the two gelatins possess unlike charges.

This mutual flocculation is consequently analogous to that observed between a positive gelatin and agar, the latter being a negative colloid.

A diagram (Fig. 2) is presented graphically illustrating this mutual flocculation effect as observed between the two gelatins.

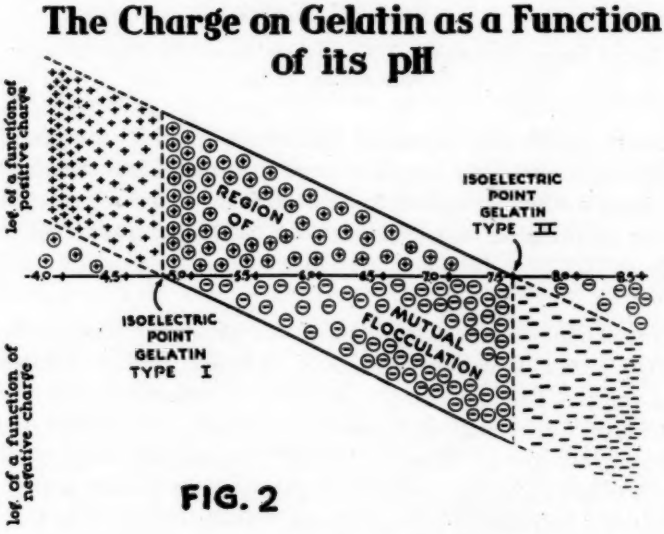

FIG. 2

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1. Briefer and Cohen: *J. Ind. Eng. Chem. 20,* 408 (1928).
2. Loeb: "Proteins and the Theory of Colloidal Behavior" (New York, 1924).

An Iodometric Determination of Sugar. J. Bitskei, *Ang. Chem. 49,* 310 (1936), through *Pharm. Zentralhalle 77,* 699 (1936). An exact amount of an alkaline copper solution of known strength is measured and after heating with the unknown sample the amount of cuprous oxide formed may be indirectly determined by estimating the amount of unreduced copper in solution and subtracting from the amount originally contained. To both the sample, following reduction of the copper, and a blank are added 0.1 n. sodium thiosulfate solution, acetic acid, solid potassium iodide and potassium thiocyanate solution. The excess of thiosulfate is titrated with iodine solution using starch as the indicator. The cuprous oxide does not necessarily need be filtered from the unreduced copper solution. L. F. T.

THE DETECTION OF EPHEDRA ALKALOIDS IN SMALL QUANTITIES OF EPHEDRA

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New enough and important enough to entail 8 monographs in the official books, old enough to have intrigued Confucius himself, Ma Huang's effective ephedrine alkaloids are quickly detected and roughly quantitated in a "less than an hour" test described in this article.

IN connection with investigations of the alkaloidal content of individual plants of various species of Ephedra, it was necessary to find a method that reveals the presence of ephedrine and pseudo-ephedrine in very small quantities of material. The ordinary alkaloidal reagents are of little use in the detection of these alkaloids. Mayer's reagent gives a positive test only when it is used with a very concentrated solution of the alkaloids. Their isolation in the pure state and identification through their melting points and other known properties are impossible when working with a few grams of material, as was frequently necessary in our investigations. It was observed by Nagai (2) as early as 1892 that these alkaloids give a pink to violet color when treated in strongly alkaline solution with copper sulphate. The reagents are the basis of the biuret test for proteins but, when proteins are known to be absent, this becomes a characteristic test for ephedrine and pseudo-ephedrine. Nagai found, moreover, that the violet pigment is soluble in ether whereas the pigment resulting from the presence of proteins is insoluble. Feng (3) in 1927 reported at length on his investigations of the biuret test as applied qualitatively and quantitatively to ephedrine mixtures. He gave special attention to a procedure designed to determine the relative proportions of the two alkaloids present in a mixture.

To determine the usefulness of the test for detecting these alkaloids individually or together in very small samples some experiments were made, first on two grams of material and then on smaller quantities, as a result of which the following procedure is recommended:

Two grams of the air-dried drug are thoroughly ground in a mortar with a few grains of clean, sharp sand, after moistening with a 10 per cent. aqueous solution of sodium carbonate. While still damp the material is transferred quantitatively to a continuous extraction apparatus adapted for use with very small quantities, and extracted with chloroform for one hour. An apparatus such as the Bailey-Walker or the Butt apparatus in which the material is warmed while extracting by the vapors of the solvent is preferable. The chloroform extract is shaken with 10 cc. of 10 per cent. hydrochloric acid in a 25 cc. separatory funnel. The acid solution is heated for a few minutes with decolorizing charcoal and then filtered into a small test tube. Sufficient 20 per cent. sodium hydroxide solution to make the solution strongly alkaline is added, followed by 0.1 cc. of a 2 per cent. copper sulphate solution. The presence of Ephedra alkaloids is indicated by the typical blue or violet color. If the alkaloidal content is not too small, the relative intensity of the color as compared with that obtained with a solution of ephedrine of known concentration will indicate roughly the concentration of alkaloids in the drug. If no color deeper than that of the mixed reagents themselves can be discerned, the test is carried through a final step by shaking the mixture with ether and allowing the ethereal solution to evaporate in a small white porcelain evaporating dish. If alkaloids are present a pink residue will remain.

This procedure makes it possible to detect the Ephedra alkaloids in two grams of the drug even when present in very small quantities. When large percentages are present the test gives positive results on much smaller quantities of the drug. In trial extractions of the drug containing 0.37 per cent. of alkaloids no difficulty was experienced in getting a positive test when using only 0.2 gram.

A simple extraction apparatus of the general type described by Butt (4) was easily constructed and used to advantage because only a small quantity of solvent is necessary. This apparatus consisted of two test tubes and a reflux condenser. A tube six inches long and three-quarter inch in diameter, drawn to a taper at the lower end with a small hole at the bottom, takes the place of the usual extraction thimble and rests in a somewhat wider and longer tube which serves as a boiling flask. The reflux condenser is fitted into the latter with the stem extending loosely into the inner tube. Chloroform is added to the material in this tube in such quantity that about

5 cc. collects in the bottom of the larger tube. Extraction proceeds rapidly because the drug is warmed by the vapors of the solvent which surround the extraction tube.

Inasmuch as the test, including the extraction, can be made in a little more than one hour it is very useful in obtaining a roughly quantitative indication of the quality of Ephedra samples, particularly when these are numerous and when the quantities available are too small to permit gravimetric determinations. It is being used to advantage in the bureau in studies of foreign species of Ephreda grown at various points in the southwestern states; in determining variations in the alkaloid content of individual plants and in quickly eliminating samples of poor quality.

REFERENCES

1. The author collaborated with the late O. F. Black of the same Bureau in adapting the test to the special purpose indicated.

2. Nagai, N. (In Japanese): *Jour. Japanese Pharm. Society* 121 (1892), 181-221; 329 (1909), 739-751.

3. Feng, C.: The "biuret reaction" as applied qualitatively and quantitatively to ephedrine mixtures. *Chinese Jour. Physiology* (1927), Vol. 1, No. 4, pp. 397-406.

4. Butt, C. A.: *Jour. Ind. Eng. Chem.* 7 (1915) 130.

Santonin in English and Welsh Artemisias. J. Coutts, *Quart. Jour. Pharm. and Pharmacol. 9,* 357-365 (1936). The author examined batches of Artemisia maritima Linn. and A. gallica Willd. plants from a number of localities in England and Wales. Assay material was air dry and represented the fine stems, leaves and flower buds stripped from the coarse stems. Coutts' assay process was used. Santonin was found in all of the twenty-seven British varieties of A. Maritima and A. gallica examined—one sample yielding 1.24 per cent. Plants of A. maritima from the same locality and of the same growth stage seem to show a slightly higher proportion of santonin than A. gallica. There is evidence of seasonal variation in santonin content. M. S. D.

ABSTRACTS FROM AND REVIEWS OF THE LITERATURE OF THE SCIENCES SUPPORTING PUBLIC HEALTH

Biochemistry, Nutrition, etc. . . . Arno Viehoever, Ph. D.
Biology . . . . . Marin S. Dunn, Ph. D.
Chemistry . . . . . Arthur Osol, Ph. D.
Pharmacy . . . . . E. Fullerton Cook, Ph. M.
Bacteriology . . . . Louis S. Gershenfeld, B. Sc., Ph M.
and their assistants

Emulsion of Liquid Paraffin with Agar. C. Gunn, *Pharm. J. 84,* 6 (1936). The method of the B. P. C. for making this emulsion is criticized inasmuch as although yielding a very satisfactory product when processed with a hand homogenizer it does not give a uniform and well dispersed emulsion using trituration methods. The B. P. C. method is a combination of the "continental" and "English" technics in which a primary nucleus is made by the customary "continental" procedure using acacia and tragacanth with oil and water in the ratio two to one. The remainder of the oil is incorporated with this nucleus followed by the agar dissolved by boiling in water. The author offers a modification in which kaolin or kieselguhr are added in small amount to the gums prior to making the nucleus emulsion. This results in the finished product being quite uniform and well dispersed. Photomicrographs are presented illustrating the improvement in quality. The addition of kaolin or kieselguhr might prove advantageous in similar emulsions made by the mortar and pestle method.

L. F. T.

New Forms and Sources of Vitamin D. Charles E. Bills, *Journal of the American Medical Association 108,* 13 (1937). The erroneous view that ergosterol is the parent substance, or provitamin, from which all vitamin D arises, was brought about by the fact that the former, a sterol of fungi, exhibits the same four ultra-violet spectral absorption bands as the unsaponifiable fraction of various materials that became antirachitic on irradiation. In 1930, however, the im-

portant discovery was made that the vitamin D of irradiated ergosterol and the vitamin D of cod liver oil act differently on rats and chickens, which discovery suggested the possibility of the multiple nature of vitamin D.

With this fact in mind and armed with the knowledge of the probable chemical structure of various sterols, chemists made slight alterations in the structure of ergosterol, such as adding two atoms of hydrogen to the side chain at position 22 of the sterol ring in one case, and from this compound removing a methyl group at position 24 in another. Upon irradiating these substances the interesting discovery was made that both products were more effective than irradiated ergosterol when tested on chickens.

Another form of vitamin D, obtained from 7-hydroxycholesterol, which exhibits an absorption spectrum containing one wide band in place of the usual four, was announced by McDonald recently. Still another vitamin D, announced for the first time in this paper, is prepared by irradiating a provitamin obtained from sitosterol, the sterol of the higher plants which corresponds to cholesterol of animals. The provitamin is prepared by oxidizing sitosterol, then reducing the oxidation product, treating this with benzoyl chloride in pyridine, and heating and saponifying the resulting ester.

Two other forms of vitamin D that are known are produced by means other than irradiation. One of these is produced by treating cholesterol with a clay catalyst and differs from the vitamin D of cod liver oil or irradiated ergosterol in being resistant to destruction by butyl nitrite. The other vitamin D of this type is that obtained by treating ergosterol with nitrites.

Counting the vitamin D of cod liver oil, there are then at least eight forms of vitamin D and it seems probable that others can be produced. To quote the author, "the study of the effect of slight differences in molecular configuration on vitamin action has only just begun." A. O.

Karaya Gum. Anon., *Drug & Cosmetic Industry 39,* 314-15 (1936). Some interesting things about Karaya Gum known only generally to those who use this particular gum for their various purposes.

The gum is an exudation from the plant Cochlospermum gossypium Family Bixaceae forming lumps or tears similar to acacia. Names common in the United States for the same gum are Kadaya, Karaya and Indian Gum. Karaya is considered more authentic since the name Indian Gum is applied to a number of different gums.

India is the source of supply and due to the large number of dialects spoken in India, this gum has been known by a wide variety of names such as: Bali, Gulu, Kahu, Kandul, Karai, Katila, Kativa, Kavali, Kawali, Kutera, Kutura, Kutira, Loli, Pandruk, Penari, Shiraz, Labsu and Velley-putali.

Karaya contains 80 per cent. of bassorin, the principle that gives the gum its expanding power when water is added. On the addition of more water, thick and transparent mucilages are formed.

As a mechanical laxative, Karaya is considered superior to agar because one teaspoonful is equivalent to two tablespoonfuls of chopped agar.

Karaya is rapidly replacing Psyllium as evidenced by Psyllium imports of 6,000,000 pounds in 1933, while during 1935 imports declined to 2,158,378.

Prior to 1918 Karaya was considered only as an adulterant for Tragacanth. As an emulsifying agent it appears to be a good substitute for Tragacanth although its higher acidity is more objectionable in certain preparations.

Karaya has replaced Quince seed in preparations like wave-set lotions and hand lotions. Lower grades are used extensively in the textile industry.

Among the reasons for Karaya's increasing popularity are (1) a constant source of supply and (2) low and quite staple prices: a minimum price of nine cents per pound held in 1922, while in 1936 the minimum price of eleven cents per pound prevailed.

Imports in 1922 were 4,829,884 pounds, which increased to 5,000,000 pounds in 1936. W. S.

Rapid Method for the Differentiation of Ordinary and Caffeine-free Coffee. C. Griebel, *Z. Unters. Lebensm. 71,* 531-537 (1936), through *The Analyst 61,* 773 (Nov., 1936). The caffeine may be extracted with chloroform and then tested for by means of the silicotungstic acid reaction. As the reaction is given by theobromine

and theophylline it is not specific for caffeine. To carry out the test, 5 cc. of an infusion of 50 gms. of coffee per liter of water are shaken with 20 cc. of chloroform for two minutes, and after allowing the layers to separate, the chloroform layer is drawn off and filtered. A 15 cc. portion of this filtrate is evaporated on a water bath, the residue dissolved in 1.5 cc. of distilled water, and to the yellowish solution three drops of an aqueous 50 per cent. solution of silicotungstic acid are added. If no crystals form after fifteen minutes, during which time the mixture has been occasionally agitated, the infusion has not been prepared from ordinary coffee; formation of turbidity and crystals indicates that ordinary coffee has been used. Milk may be separated from the infusion by shaking out the fat with petroleum ether and using the aqueous layer. The limit of the reaction is 0.4 gamma in a concentration of 1:2500. W. G. B.

Cacao Hulls as a Source of Vitamin D. R. Achcenich, *Kazett 25*, 443 (1936), through *Pharm. Zentralhalle 77*, 762 (1936). Knapp and Coward in England have already demonstrated the strong antirachitic action of cacao hulls. This author tested fourteen samples of hulls on rats and found that they contained between thirty-one and 125 international vitamin units. There is practically no vitamin in the fresh hulls. It develops under the influence of fermentation and exposure to sunlight during drying. Irradiation with a mercury-quartz light increases the vitamin content very considerably. The author suggests the feeding of the hulls to cattle to increase the vitamin D content of milk and butter. L. F. T.

The Toxicology of Dioxan. W. Wirth and O. Klimmer, *Arch. Gewerbepath. 7*, 192 (1936), through *Pharm. Zentralhalle 77*, 762 (1936). Dioxan is widely used as a solvent in the cellulose, lacquer and fat industries. The authors studied the toxicity of this substance, using mice and cats as test animals. When inhaled by these animals it produced an irritation of the respiratory tract, including to some extent the lungs. Furthermore, it was found that a large part of the inhaled Dioxan was absorbed producing first a stimulating effect followed in larger amounts by lameness. When inhaled it is as toxic as methyl alcohol and it is quite significant that the first reaction to

its toxic effects appears after several days. No cumulative action was observed and when tested on the isolated frog's heart no toxic reaction occurred. Dioxan is detectable by its odor in a concentration of 0.00028 per cent.; irritation occurs at a concentration of 0.14 per cent. No irritation was produced when it was applied to the human skin. The authors, on the basis of their investigations, feel that this solvent may be used for medicinal and cosmetic purposes which has solvent may be used for medicinal and cosmetic purposes as has already previously been recommended. L. F. T.

Tests for the Quality of Rose Water of the P. H. V. R. Rosenthaler, *Pharm. Acta Helv. 11,* 183 (1936), through *Pharm. Zentralhalle 77,* 760 (1936). According to the specifications of the P. H. V. rose water must be prepared by distillation. The preparation according to the German method was adopted since the latter gave more uniform and better perfumed products. The test for the purity of the preparation is a study of its bromine absorption capacity and its behavior towards phenylhydrazine. For the former test 50 cc. of rose water are treated with 20 cc. of 0.1 n. bromide-bromate solution and 30 cc. of diluted sulfuric acid added; the next morning 1 gm. of potassium iodide is added and the liberated iodine titrated with 0.1 n. sodium thiosulfate. The phenylhydrazine test consists in adding 1 cc. of freshly prepared 5 per cent. phenylhydrazine hydrochloride solution to 10 cc. of the rose water and observing the reaction after ten minutes. The bromine absorption varies between 1.1-9.7 cc. 0.1 n. bromide, the normal value lying between 4 and 5 cc. True, rose water gives at most only a very slight turbidity with phenylhydrazine. The evaluation of the odor is also important and this should be considered as well as the two tests outlined above. L. F. T.

Helenalin, from Helenium Autumnale. E. P. Clark, Bureau of Entomology and Plant Quarantine, U. S. Dept. Agriculture, *J. A. C. S. 58,* 1982 (1936). Helenalin extracted from Helenium Autumnale holds out promise of proving an addition to the list of insecticides. It has the condensed formula $C_{15}H_{18}O_4$. While the structural formula has not been worked out, it is known that in the molecule there are two double linkages and one hydroxyl group. The isolation of helenalin is briefly as follows: the dried plant is extracted by percolating with

chloroform. The percolate is concentrated under reduced pressure, evaporating to a syrupy consistency and extracted with hot alcohol. This solution is concentrated, diluted with boiling water, acidified with acetic acid, and clarified with lead acetate solution. The filtrate is concentrated and extracted with chloroform, the chloroformic solution, after concentration, being finally extracted with benzene. The crystallized helenalin is obtained from the benzene solution, the yield being about one-third of 1 per cent. Helenalin is an effective fish poison, it acts as a vermifuge, and it may prove of service as an insecticide. J. W. S.

A Delicate Test for Blood Pigments. L. B. Jensen and W. M. Urbain, *Food Research 1,* 275 (1936). A test is described for the detection of blood pigments in tissues and in meat products. It is claimed to be delicate and simple. The method employed involves two essential steps: (1) conversion of the hemoglobin compound to nitroso hemoglobin or to nitroso hemochromogen, and (2) treatment of the nitroso derivative with hydrogen peroxide producing a green derivative. The substance to be tested is first reduced with sodium hydrosulfite; the nitroso derivative is formed by treatment with sodium nitrite and the green product is obtained by addition of hydrogen peroxide. Two modifications of the test are described.

L. A. R.

Mandelic Acid and Mandelates in Urinary Infections. H. F. Helmholz and A. E. Osterberg, *J. A. M. A. 107,* 1794 (1936). Some interesting observations from American and English workers concerning the use of mandelic acid and mandelates in the treatment of urinary infections are presented as well as valuable clinical and laboratory findings. The need for caution and even a note of warning are presented by these workers in which the following are of interest: Not enough is known about these new drugs to warrant the use of the unrestricted title of "urinary antiseptic"; care is to be observed in the use of these products in patients with a reduced renal function and especially in the aged; and attention must be directed to the possible complications, especially hematuria, when using these drugs.

Mandelic acid, when given by mouth, is recovered in the urine unchanged. A low pH of the urine is also needed for effective re-

sults. Ammonium nitrate or ammonium chloride in doses of from four to six grams daily to render the urine acid is given with mandelic acid or sodium mandelate. Usually one ounce of a 10 per cent. solution of the latter is given orally before each meal and at bedtime so that the intake of the drug is twelve grams daily. Ammonium mandelate and ethanolamine mandelate are recommended in most instances without the addition of an acidifying drug. Recently the ammonium mandelate was suggested in a 40 per cent. syrup solution. Mandelic acid and the mandelates are now obtainable in this country, being produced by some of the American manufacturers. L. G.

Development of the Macrogametophyte in Certain Labiatae. E. P. Bushnell, *Bot. Gaz. 98,* 190-197 (1936). The author investigated the development of the macrogametophyte in Monarda fistulosa L., M. didyma L., M. punctata L. and Nepeta cataria L., using Wisconsin material. The fixed flowers and flower buds were run into paraffin, sectioned and stained with Flemming's triple stain or with Heidenhain's iron-alum haematoxylin. She finds that M. fistulosa has the largest macrospores and that the embryo sac is of the seven-celled type—the chalazal macrospore being the functional one. The integument is thicker in M. didyma and M. punctata than in M. fistulosa and N. cataria. M. S. D.

Cultivation of Ephedra in South Dakota. B. V. Christensen and L. D. Hiner, *J. A. Ph. A. 25,* 969-973 (1936). Ephedra sinica plants have given proof of their hardiness in South Dakota surviving in the field scanty rainfall, intense cold and winds so severe that, the top soil having been blown off, the plants were anchored only by the tips of their tap roots. Since there is no domestic source of the drug, the authors became interested in the possibility of raising E. sinica on a commercial basis and are investigating methods of propagation and cultivation of the crop, and methods of harvesting and curing to obtain the best yields of ephedrine. The article deals with their methods and findings.

A study of the results of their investigations suggests to them among other things that (1) Ephedra sinica stems and roots are hardy and perennial in South Dakota, (2) propagation may be both

from viable seeds produced by the plant and by runners, (3) late September is a favored time for harvesting, (4) stems produced in a single growing season ran low in ephedrine content but stems which were matured for a second growing season showed increased ephedrine content, (5) sun curing is to be preferred over oven curing and shade curing since it yields the greatest amount of the active principle, (6) although the best assay figure thus far is considerably below that of the imported drug, ephedra of fair quality can be produced in South Dakota. M. S. D.

Recent Development in Fungicides: Spray Materials. J. W. Roberts, *Botanical Review 2,* 586-600 (1936). This paper presents an excellent short review of some of the more important data concerning fungicides. The author believes that while the fungicide of the future will probably be of organic nature, as yet none of the organic compounds or derivatives of these organic compounds shows promise of replacing the more important inorganic fungicides now in use. A list of 102 references is appended. M. S. D.

Psyllium, Ispaghula and Related Seeds. E. W. Skyrme and T. E. Wallis, *Quart. Journ. Pharmacy and Pharmacology 9,* 198-202 (1936). This article, after summarizing the similarities of the Plantago seeds listed—mucilage present in the epidermis of the testa, nucellus not represented in the seed, seeds boat shaped, etc.—presents two tables formulating the characters of the seeds. The first table deals with the macroscopical characters of P. ovata, P. amplexicaulis, P. psyllium, P. arenaria, P. lanceolata and P. cynops (weight, size, volume, swelling factor, shape, dorsal face and ventral face). The second table deals with the microscopical characters of the same species. The results confirm Netolitzky's statements. M. S. D.

Plants Made Poisonous by Selenium Absorbed from the Soil. S. F. Trelease and A. L. Martin, *Botanical Review 2,* 373-396 (1936). This is an interesting review of the selenium problem which has recently come into prominence. Fifty-five appended references.

M. S. D.

PRONTOSIL AND PRONTYLIN—The New Bactericides

The present unusual interest in Prontosil and Prontylin is due to the publicizing of the use of one of them in the treatment of Franklin D. Roosevelt, Jr., the President's Son, during his recent serious illness.

Heidelberger and Jacobs, of the Rockefeller Institute, eighteen years ago directed attention to the bactericidal properties of para-sulfonamido benzene-azo compounds. It was not until 1935 that Professor G. Domagk ("Ein Beitrag zur chemotherapie der bakteriellen Infektionen"; *Deutsche med. Wchnschr. 61,* 250 (Feb. 15) 1935), chemotherapist of the Interessengemeinschaft and a disciple of Professor Heinrich Hoerlein, director of pharmaceutical research for the latter, revealed experimentally that azo-compounds containing a sulfonamide group are specific bactericidal agents and possess therapeutic activity in streptococcus infections. He investigated the textile azo dyes reported by Hoerlein and the additional bactericidal azo-compounds presented by Nietzsch and Klarer with the result that a series of azo-dye derivatives were introduced by him. In his original article the following two important ones are mentioned: Prontosil—a dark red dye, the hydrochloride of 4-sulfamido-2: diaminoazobenzol and Streptozon S. or Prontosil soluble—the di-sodium salt of 4-sulfamido-phenyl-2-azo-7-acetylamino-l-hydroxy-naphthalene 3:6-disulphonic acid.

Fourneau, chemist at the Pasteur Institute in Paris, introduced a non-azo colorless product, para-aminobenzene sulfonamide, which revealed specific bactericidal action against streptococci. He and his associates claim that this effective simple bactericidal agent is what is actually produced in the body when azo-sulfonamide benzene dyes are introduced. This, a non-azo colorless compound, is said to be less toxic and more active than the azo products producing it.

Compounds other than prontosil and Streptozon S. or Prontosil soluble, which have been introduced mainly in European countries, are also prepared by a linkage of azo dyes with a sulphonamide group. Different trade names are used by various manufacturers. Among the former are to be found Prontylin and Rubiazol. Studies in European countries on these azo-sulfonamide dye compounds present conclusions in which it is said that these dyes are efficacious in certain hemolytic streptococcic infections and to a lesser degree in

combating pyogenic staphylococci. They are said not to be effective against streptococcus viridans. Some of the products (as Prontylin) are administered orally and others (as Prontosil) are introduced directly into the peritoneal cavity, by the intramuscular route or even intravenously. Most of the studies on the curative and prophylactic action of these products in streptococcal and even other infections have been presented by German workers during the past two years. Among these are Anselm, Fuge, Kramer, Lampert, Rechnagel, Schranz, Scherber, Schreus and others. Levaditi and Vaisman and Nitti and Bovet in France and Colebrook and Kenny in England presented interesting findings. In the United States studies have been made at the Massachusetts General Hospital and other hospitals in Boston, at the Presbyterian Hospital in New York, and at Johns Hopkins, and within the last month Drs. P. H. Long and E. A. Bliss, of the latter institution, read a paper on this subject at the Southern Medical Association meeting.

Thousands of lines giving some information concerning these products have appeared and even editorials have been written in newspapers throughout the country during the first few weeks of December, 1936, when it was reported that the president's son, Franklin D. Roosevelt, Jr., was successfully treated with one of these products to combat a streptococcic infection, the initial lesion of which was in the maxillary sinuses. Much misinformation appeared in print in the daily press. As usual, in such cases, when great hope in the use of new drugs is stressed, the laity becomes concerned and pharmacists and others in the medical sciences are bombarded with questions concerning the value of such drugs.

The present status of these products in this country is that clinical and experimental investigations have been initiated. One of the American pharmaceutical manufacturers is producing trial batches for these investigations. These drugs have not as yet been considered by the Council on Pharmacy and Chemistry of the American Medical Association. Articles in the foreign literature do not appear to supply all the necessary facts so as to make possible a proper evaluation of these products. Though some of the comments from apparently reliable sources are impressive, further detailed investigations and clinical trial by competent observers are needed. It may even be necessary to confine studies to just a few of the many compounds rather than attempt to cover the whole array of products introduced. And

finally notation is to be made of the transient toxic effects and the production of a sulfhemaglobinemia as produced in some cases by the administration of these drugs.

Louis Gershenfeld.

Medical Action and Use of Calcium Lactobionate-Calcium Bromide. Horace S. Isbell, *Bureau of Standards Journal of Research 17,* 331 (1936). The double salt of calcium lactobionate and calcium bromide, which was prepared for the first time at the National Bureau of Standards, gives promise of becoming an important medicinal agent. According to clinical tests published in foreign journals, its sedative action is almost twice that which corresponds to its bromine content, and when administered in effective quantity it does not cause "bromide rashes" such as frequently develop when alkali bromides are used. The prevalence in the United States of neurasthenia and similar ailments which require sedatives of various types should afford a lucrative market for this salt. The simple process for its manufacture reported in this paper should make it available to all for the alleviation of suffering and distress.

The simplest method of preparing calcium lactobionate-calcium bromide consists in oxidizing lactose with bromine water in the presence of calcium carbonate, followed by crystallization of the double salt from the resulting solution. This method is not economical because only half of the bromine is converted into the double salt. To overcome this objection the author describes a process in which the bromine oxidation is combined with electrolytic oxidation, a process which is essentially the same as that employed in the manufacture of calcium gluconate, except that one equivalent of bromine is added and one faraday of electricity is used for each equivalent of lactose. Complete details for manufacturing the salt are given in the paper. The essential features of the process are covered by a patent assigned to the Government of the United States, to which application may be made for license to use the patent. A. O.

PROGRESS IN THE CHEMISTRY OF LIFE

Vital Substances in Food and Medicine. Provitamin and Vitamin A.

Vitamins, as stimulators of life, occupy the focal place in life processes—carotinoids and xanthophylls are, at least in part, transformed in the animal body into vitamin A. The depot fats of human beings, examined by Zechmeister (1934 and 1935) contained α and β carotene, the carrot pigment, lycopin, the tomato pigment, capsanthin and xanthophylls; that of chicken, horse, pig, various carotinoids; canary birds deposit their carotinoids, obtained from the diet, in their feathers. Even crustaceans, as the transparent palaemonites, deposit carotinoids as astacin in their tissue.

A common source for provitamin is the tomato juice, introduced only about ten years ago, and now one of the best sellers on the food shelf. Carrot juice is appearing as the new health drink, withstanding the canning process very well, quite palatable and more acceptable to children than tomato juice. Other rich vegetable sources are kale, green lettuce and turnip greens, water cress and spinach, peas and runner beans. Good sources for the fat soluble, colorless vitamin A, quite stable even in cooking, are the dairy products, egg yolk, liver and the liver oils of cod, halibut and salmon and swordfish.

According to recent studies of Schieblich and Vlassopoulos (Ztschr. Unters. Lebensm. 71, 415, 1936), of fruits from Greece, figs contained per gram 2.4 international units, St. John's Bread and raisins only traces of provitamin A. Fresh pine needles of Picca excelsa (according to Matzko, loc. cit. 71, p. 330) contains per gram about 130 vitamin A units. A new source for provitamin, filling the need for vitamin A, was found by the writer in the berries of the matrimony vine or boxthorn (Lycium halmifolium).

Vitamin A promotes growth and has been claimed to be essential in pregnancy and for the maintenance of health and adequate nutrition at all ages. Absence from the diet causes the disease of the eye, known as xerophthalmia, and skin changes, probably due to infection in lowered resistance. For treatment of such skin diseases ointments or powders, containing cod liver oil and thus vitamin A, have become popular preparations. Vitamin A treatment, administered to over 200 students by Cameron (1935) during the winter months, in the form of carotene solution, cod liver and haliver oil, lowered somewhat the severity and duration of the colds.

According to Stepp (Pharm. Ztg. 734, 1936) vitamin A has become a valuable medicinal substance, in afflictions, having nothing to do with vitamin deficiency as in excessive thyroid function, in severe cases of loss of weight, in blindness at night.

Of particular interest is the recent observation of Dr. Henry C. Sherman (Scientific Monthly, p. 105 (August) 1936) that in health and longevity there is an optimum limit in intake of food substances and vitamins. For vitamin A the optimum is about four times higher than the minimum need of normal nutrition.

Arno Viehoever.

Chemical Transmission of Nerve Impulses

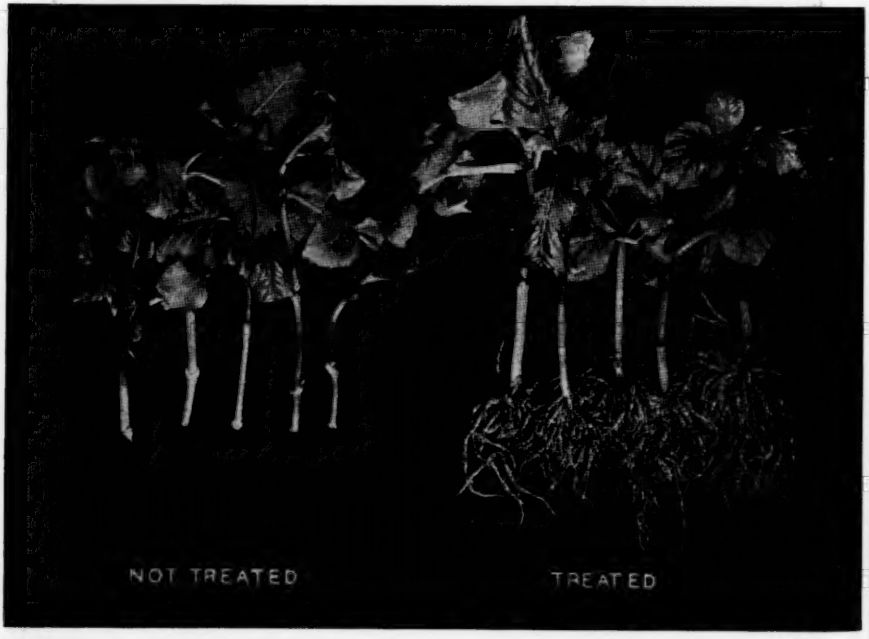
In the light of recent work it has been definitely shown, as pointed out in a leading article, *Brit. Med. Jour., 3945:*340, that the transmission of nerve impulses depends on chemical substances. These are two in number, acetylcholine and sympathin, the latter being suprarenal in origin but as yet not proven to be identical with epinephrine. The actions of acetylcholine are various: it is a vasodilator of great strength; it is, in contradistinction to atropine, a stimulator of parasympathetic nerve endings; its administration results in characteristic voluntary muscle contraction. Acetylcholine is inactivated by an esterase present in the blood, and is protected against the action of this esterase by eserine in minute doses. That it is liberated at myoneural junctions when the nerve is stimulated has been shown by the carefully controlled experiments of Dale *et al., Jour. Phys., 86:*353.

The exact mode of action of acetylcholine has not yet been determined. It is known, however, that eserine (physostigmine), enhances its action, even in minute doses. Whether conditions in which the adynamic state of muscular tissue is the predominant symptom, myasthenia gravis and paralytic ileus for example, are due to excessive destruction of acetylcholine by the esterase is not yet clear. But that physostigmine permits the presence and action of acetylcholine, probably by protecting it from the esterase, is quite definite. (*Roche Review.*)

PLANT HORMONES

A German botanist, J. Sachs, asserted over fifty years ago (1882) that specific substances (not foods) present in extremely small quantities directed the activities of cells. Such substances were later discovered in animals and designated as hormones, "substances normally produced in the cells of some part of the body, and carried to distant parts, which they affect for the good of the body as a whole" (Starling, 1914).

The interest in plant hormones was revived by Jacques Loeb (1916) as related in my published lecture on "Hormones—Vital Substances in Life" (Vol. 5, p. 104, 1927). The foundational work on the plant growth hormone auxin, found both in root tips and animal urine, is discussed in interesting detail, with numerous references by F. W. Went, one of the pioneers in this field (Botanical Review, Vol. 1, pp. 162-182, 1935), and by K. V. Thimann in Vol.



(Courtesy of Merck's Report.)
Dahlia cuttings treated with 40 units "Hormodin" in water for 16 hours. Note profuse rooting of treated cuttings in 16 days after treatment.—(Hitchcock.)

IV of the *Annual Review of Biochemistry*, pp. 545 to 568. Here also those growth promoting substances found of benefit to lower organisms as fungi and yeast (so-called bios) are referred to.

Since then Hitchcock, Zimmerman and Wilcoxon, in particular, have taken up this work in this country. The results of their work with synthetic auxin-like growth substances is published in recent contributions from the Boyce Thompson Institute for Plant Research. Earlier rooting and more abundant root growth has been induced in cuttings or shoots of holly, yew, rose of sharon, maple and chrysanthemum with preparations of indole-acetic, -proprionic, -butyric acids, and naphthalene acetic acids. More recently phenylacetic acid and the methyl and ethyl esters of these acids have been used with advantage. Cuttings of dahlia, rose and American elm have been successfully treated.

The basal ends of cuttings were placed in tap water solutions of the growth substance. The use of concentration of 1-4 mg. per 100 cc. required a treatment of one to four days; one-day treatment sufficed, using a 4-20 mg. per 100 cc. solution of indoleacetic acid and 2-10 mg. of either indolebutyric or naphthalene acetic acid. Lanolin preparations of growth substances applied to succulent plants as tomato effected in one to two hours bending responses, followed by swelling and rooting.

Of special interest to retail druggists is that these plant growth hormones are already commercially produced, to be distributed shortly under the trade name "Hormodin," protected by Merck and Company.

The forced growing of nursery stock, horticultural and floricultural plants by means of these economically useful hormone-like growth-producing substances is already assured. The possibility of forcing vegetation propagation of medicinal plants, as digitalis and others, pointed out in my published lecture on "Control of Growth in Plants and Animals," Vol. III, p. 212, 1925, Popular Science Lectures, is now increased. Merck and Company offer to distribute descriptive literature (see Merck's Report, January, 1937)

A comprehensive discussion of the role of growth hormones in normal growth and other responses in plants, prepared in book form by Jensen of Copenhagen, one of the discoverers, has been translated and will be shortly available under the title "Growth Hormones in Plants" (268 pages, illustrated, $3.50, McGraw Hill, Publisher).

Arno Viehoever.

LIPOIDS

No uniform definition is possible, according to Professor Bleyer from Munich, Pharm. Zeitg. 1936, but the designation is useful for protoplasm, cell or organ studies. According to Overton and Mayer lipoids function in cell and surface layer formation.

After the marked successes of vitamin and hormone research, to the lipoid cell contents must be attributed further specific vital functions. The old conception of the "dead" fat is in contrast to the "active" cell lipoids, i. e., participating in cell life. Thus the definition of Halden (Halden, Rosenbunk and others) becomes useful for physiologists and chemists:

Lipoids are non-volatile substances from plant or animal cells, biogenetically related, occurring, on account of their solubility, in fats, oils, waxes, or mixed with fats, oils, waxes in the normal fat solvents and are dissolved with them from their natural places of storage.

Lipoid system: The collective term "Lipids" embraces glyceride fats, wax alcohols and wax esters, higher fatty acids, phosphatides, cerebrosides, and in a broadened sense higher unsaturated hydrocarbons—sterols, sterole esters, lipochromes, pigment waxes and fat soluble vitamins, or lipo-vitamins. All natural fats are unsaturated. Most lipoid substances, as natural phosphatides, sterols, lipochromes and lipo-vitamins are also unsaturated. The important lipoids are phosphorus-free cerebrosides, and phosphor-containing phosphatides, with special lecithins derived from glycerin-phosphoric acid, differentiated according to their basic component—cholin, or colamin, in cholin lecithins, and colamin lecithins.

Increased utilization of oil seeds for commercial oils, as that of soy beans, placed plant phosphatides in the foreground, through their extraordinary properties, as:

1. Emulgators.
2. Increasing the plastic properties, etc.

The plant phosphatids (plant lecithin commercial grades) are not less valuable than animal phosphatides, and are now available in excellent condition through progressive and technically perfected methods. Therapy may well benefit from this development. A revival of the lecithin treatment, formerly accepted with great hopes, but disappointing on account of too small doses used, is now possible with more prospect of success.

COLLECTIVE TERM: LIPIDS

A. Fats and Waxes

Glycerin esterified *with* fatty acids

with other alcohols univalent higher alcohols

with higher fatty acids (wax-acids).

B. Fat or Wax-like Substances: Lipoids

Phosphor-free cerebrosides sugar containing

Cerebron, Kerasin, Nervon and others

Phosphor-containing phosphatides (Phospho-Lipoids)

Common Lecithin

Cholin Lecithin

Sphingase Lecithins

Colamin Lecithin (Kephalines)

Side Constituents of Natural Fats and Oils
(Lipoids in Broader Sense)

High molecular 300 sterols as Cholesterol Caprosterol

Sterols and Sterol esters secondary alcohols with several partially hydrated ring systems

Phytosterol as Ergosterol

Sexual Hormones Bile acids Toad-poisons through U. Violet radiation: Vitamin D_2.

Lipochromes as β carotin (Provitamin) split in 2 mol. Vitamin A.

and Carotinoids and unsaturated higher hydrocarbons as Carotene Lycopin Squalin in fish cod liver oils —Source: Isopren

ARNO VIEHOEVER.

INSECTICIDES

Potential New Insecticides

In order to find arsenical substitutes Ginsburg and Cavallito (*Journal of Economic Entomology 29,* 856-859, 1936) tested 121 water insoluble organic compounds as stomach poisons against silk moth larvae. Of the seven chemicals producing mortality from 55 to 100 per cent. after three days, only one, methyl undecyl ketone, contained no nitrogen. The others, thioacetanilide, phenothiazine, d-glyoxime, d-camphoroxime, diphenyl nitrosoamine, p-nitrophenetole, contain nitrogen. Thioacetanilide and phenothiazine with nitrogen as amino groups and sulfur as thio groups showed highest toxicity to these chewing insects. Phenothiazine, made by combining diphenylamine with sulfur, is however exceedingly irritant to skin.

Of several hundred synthetic organic compounds tested, Smith, Siegler and Munger, of the U. S. Bureau of Entomology and Plant Quarantine (*loc. cit.* 1027, 1936), found phenothioxin, thiocoumarin and p-nitro-iodobenzene particularly toxic, when freshly applied, against codling moth larvae. As other widely used organic insecticides much of their effectiveness is lost upon exposure of their spray deposit.

Pyrethrum

Pyrethrum powder, when tested by Wisecup (*loc. cit.* p. 1000) by biological tests, showed no significant loss of insecticidal value when stored in closed containers for three years. Equally pyrethrum-tobacco mixtures showed only definite deterioration when stored in open containers for one to two years. These materials should always be kept in very tight containers. The progressive loss of activity due to the effect of storage, observed previously in connection with other factors as light and heat, has thus been verified.

Rotenone and Pyrethrins

Used alone and in combination, when tested by Le Pelley and Sullivan (*loc. cit.* p. 796) against house flies, they showed an increased effect in 50-50 mixtures of the alcoholic solutions. Apparently the paralyzing effect of the pyrethrum was supplemented by the crippling and lethal effect of rotenone leaves of Cracca vogelii (from Kenya Colony, East Africa) showed more toxicity (equivalent to about 2 per

cent. rotenone) than the roots or stems of the same plant. In comparison, other rotenone sources as derris and cubi have recently been found to contain up to 10 per cent. rotenone.

Insect Control

Opportunities in development of insect control measures by chemical means of insecticides is an interesting chapter in the history of entomology, stated De Long in *J. of Econ. Entomology 29,* 808 1936. The new situation offers excellent opportunities for young men, properly trained and qualified to undertake these studies. It is an opportunity to approach a problem from the various angles of insect toxicity, chemistry, physics and human and plant physiology. Industry, according to present indications, will go even further and stimulate and encourage basic work in biology and etiology as well as chemical control.

Arno Viehoever.

Man's several senses are limited by a kind providence, each within its narrow range. Thus man cannot see, cannot hear, cannot smell, nearly as well as the ferret, the flea or the fly—except when he amplifies his senses with his own mechanical creations.

Lutz has shown that insects are able to see clearly by ultra-violet rays which are invisible to man. Insects doubtless see each other in patterns that our eyes miss entirely. By ultra-violet light, for instance, common spotted yellow cabbage butterflies appear in a uniform deep color, the sensation of which we cannot even remotely visualize. To our eyes, male and female Luna moths look very much alike, though experts can sometimes identify the male by his yellower shade of pale green. In ultra-violet light, the contrast between the sexes is as great as that between day and night, for the female is very pale and the male nearly black. Moths and butterflies with a close resemblance should not fool one another, since the ultra-violet markings are usually unique for each species. Flowers, also, have their distinctive ultra-violet characteristics, which are often far different from the patterns visible to humans.

SOLID EXTRACTS

By Ivor Griffith, Ph. M., Sc. D.

Despite the form in which this information is presented it may be accepted as trustworthy and up-to-date. Original sources are not listed but they may be obtained upon request.

The nine lives of an alley rabbit are easy enough to understand when it is appreciated that when once Tabby has died a cat, he may be reincarnated in at least eight different ways. A black cat across your path is bad luck—across your back it is a *genet.* When a rabbit or a coney is unwrapped, the flesh, under proper treatment, becomes hassenpfeffer—but there is no telling what the pelt may become.

The National Association of the Fur Industries issues a dictionary of fur names. Over fifty varieties of fur are named therein, all having their origin in the common cottontail. And here are some of the timid little creature's post-mortem trade names—Baltic Leopard, Baltic Tiger, Baltic Lion, Chinchillette, Ermiline, French Sable, Sealine, Sealette, and last but not least the recently popular "Lapin."

Shades of Br'er Rabbit!

Jeremiah, I believe, was the prophet who propounded the oft-repeated query, "Can a leopard change its spots?" Well, if the leopard cannot, the chemist can do it for him—and better than that, he can build a perfectly *ripping* leopard out of a bunch of backyard bunnies.

Believe this or not—about Bunsen—and a bad bug—and beryllium—but I have it on the authority of the Fisher Scientific Company of Pittsburgh, whose little booklet "The Laboratory" is a welcome now-and-again visitor to my bewildering desk.

"Professor Bunsen one day was analyzing the mineral beryl and had obtained beryllium hydroxide on the filter. While the water pump was sucking dry this mat of sticky sweetness Bunsen went away to attend to some other experiments. On his return he noticed a large fly perched on the edge of the filter, sinking his proboscis in the precipitate.

Bunsen grabbed for the fly but missed. Then ensued a noisy chase, Bunsen slapping in all directions seeking to catch the fly.

Students entered into the chase and at last the thief was caught. Bunsen carefully killed the insect, taking great care that he did not knock off the proboscis which had some of the hydroxide attached to it. He ignited the fly in a platinum dish, over a Duncan *burner, moistened the residue with hydrochloric acid and recovered a tenth of a milligram of beryllium oxide. This added to the bulk of the ignited beryllium hydroxide gave a more accurate result. No fly could pick up a speck of material that Bunsen was analyzing and get away with it."*

And no professor will ever risk, except at his own beryl, telling this tall story to his chemistry class.

Well, here is another brick for Bryan's mausoleum.

"Brains of the three highest apes, orang-utan, gorilla and chimpanzee, show beginnings of a part of the structure that controls speech. It is not found in the brain of any other kind of ape or monkey."

So states the American Journal of Physical Anthropology!!

Man, and, of course, to a much greater degree, woman, are the only talking animals. But Broca's area in the forebrain cortex, said by the neurologist to harbor the power of speech, is now alleged to be demonstrable in the heads of the higher apes.

All of which proves Darwin's guess to be as good as anyone's guess!

Sarsaparilla is old—perilla is perfectly new! Indeed, the oil of the year is perilla. On the one hand, the United States will import from Japan at least 150,000,000 pounds of it this year, as against half that much the year before, and a negligible amount before that; on the other hand, the perilla plant is now started as an American crop.

Why did perilla oil stand known but unappreciated for generations, and then suddenly become of the greatest interest? Because it has been found of great value in making soya-bean oil useful for paints, varnishes and linoleum. Soya-bean oil needs the help of its Manchurian partner, perilla, in order to dry sufficiently fast. The partnership of the two oils incorporates the cheapness, pale color and long-lived flexibility of the soya oil with the quick-drying action of the perilla, and, in varnish cooking, the quick-bodying of the perilla oil, as well.

Forty years ago a class of 100 graduated from a well-known eastern university. The American Banker's Association has just made a critical survey of those 100 young people, and their progress since that sunny day in June, when life seemed so rich in roses and thorns were only few. This is the result of the survey, and it serves as a splendid summons to a still more expansive social security plan. Listen. Of the 100 graduates, forty years after, five had succeeded, fifty-nine had failed and thirty-six had died. Of those who died only nine left some estate and twenty-seven left nothing to show for their years of preparation and years of work.

By the same token the chances are two to one that we shall be living at sixty-five, and except for the New Deal's idea, five out of six of us would be dependent on charity at that time.

Smog is a Menckenism meant to convey the character of Pittsburgh air, loaded as it is with smoke, soot and all sorts of atmospheric dust. Actually, and on the authority of a Mellon Institute, a square mile of Pittsburgh soil annually receives the malediction of over 2000 tons more soil, mostly the soot and silt of a million flues and chimneys. Were it not for the kindness of wind and rain that continuously move this sullen slime from Pittsburgh's surface, every five years that busy town would have to dig itself out from a carboniferous crucible.

No wonder our solatics (in contradistinction to lunatics) wail so because these sky miasmas hide the glory and healthfulness of the sun from city dwellers.

Latterly a group of scientists have charged that carbonaceous soot is one of the causes of that great scourge of civilization—the dreaded cancer.

The toxic chemical *arsenic* has had a bad reputation since the earliest days of recorded history. Indeed, its very name suggests its death-dealing strength.

It is from the Greek word *arsenikon* (Latin, arsenicum) meaning "possessed of strength." When poisoning was practiced as a fine art in Italy some few centuries ago, one of the most popular liquid weapons was Toffana water, sold as a beauty lotion, but in fact more commonly used for criminal poisonings.

On its label it bore the picture of a bewinged saint, and true to its label, it rarely failed to perform its sanctifying business.